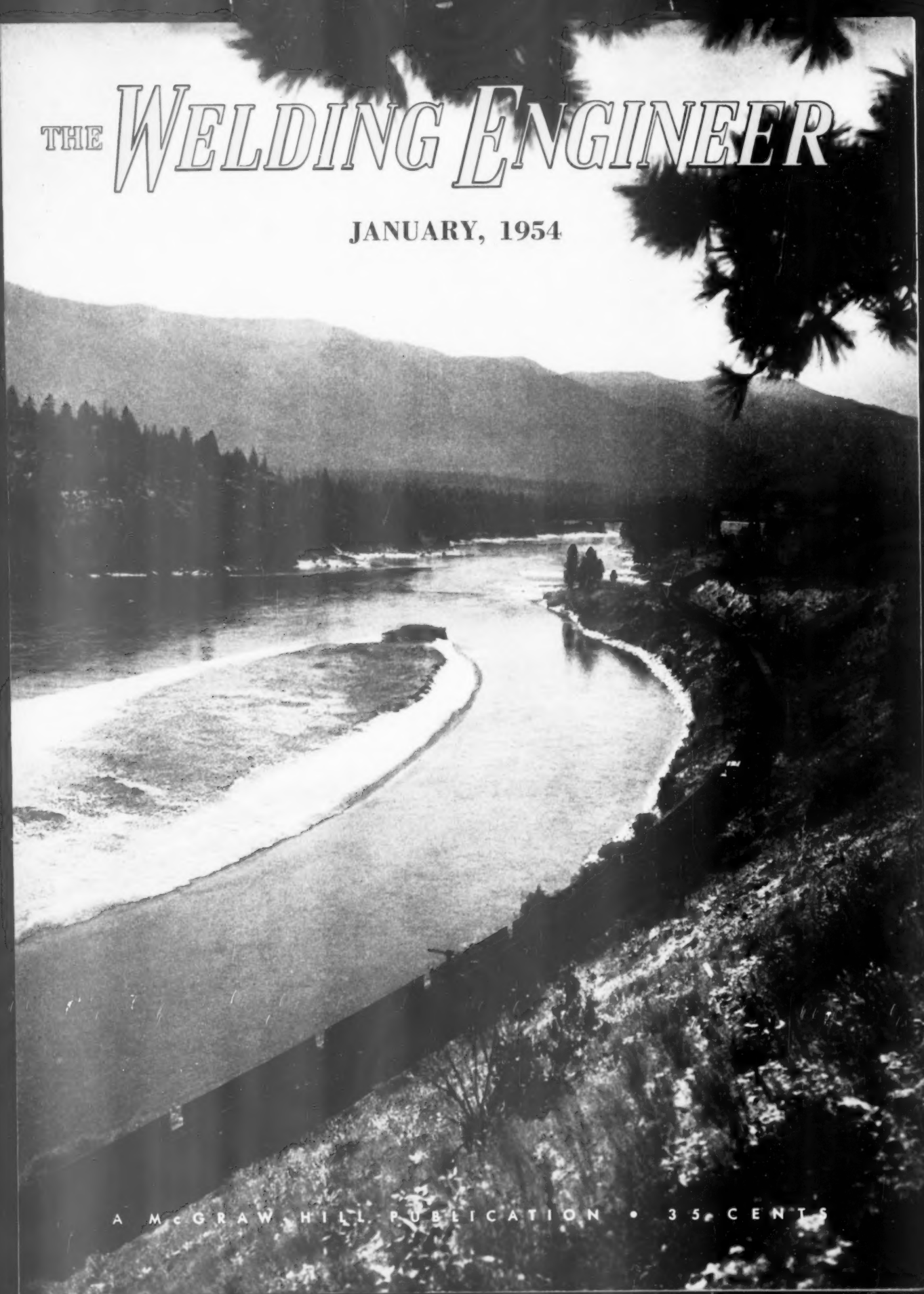
THE WELDING ENGINEER

JANUARY, 1954



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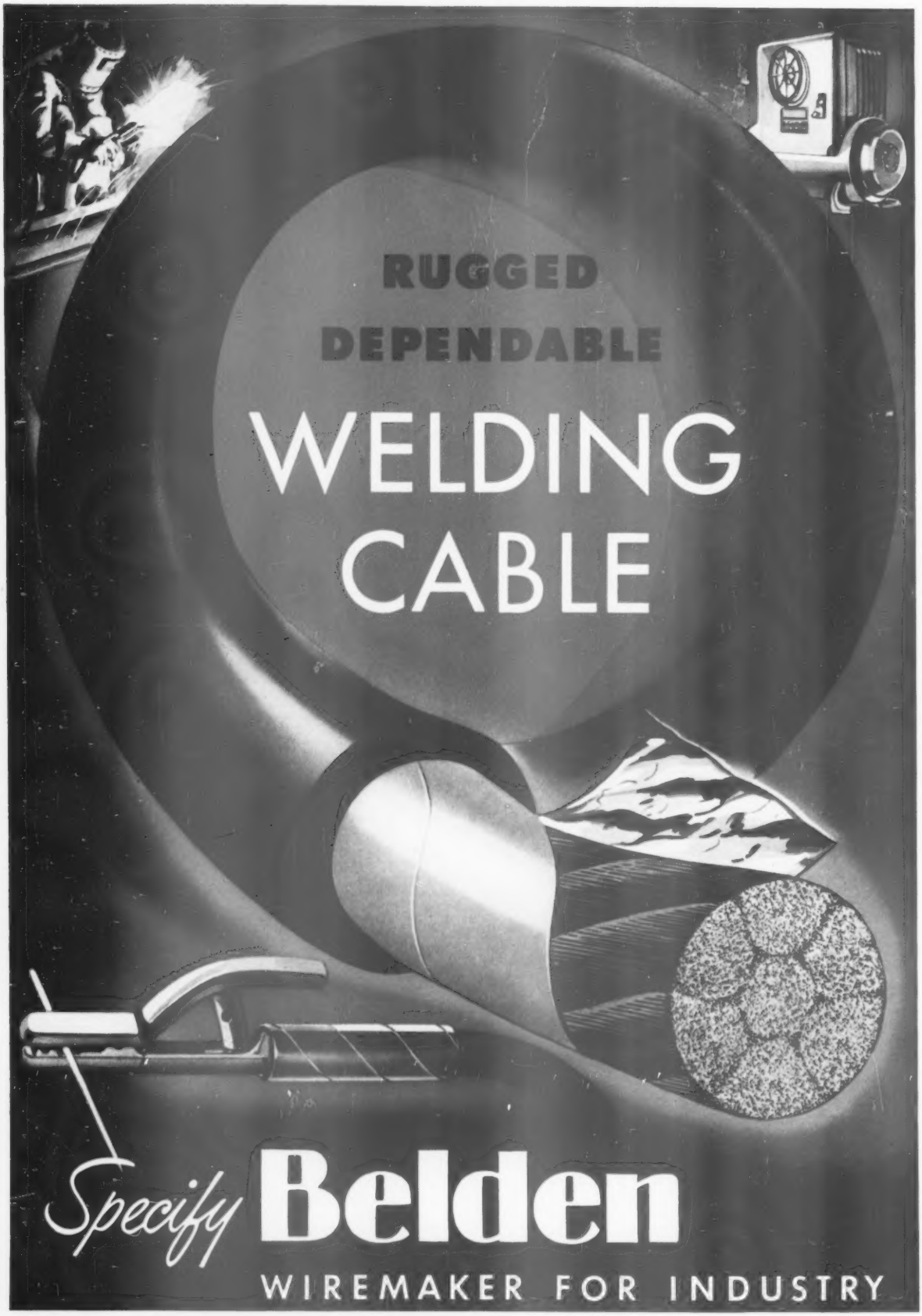
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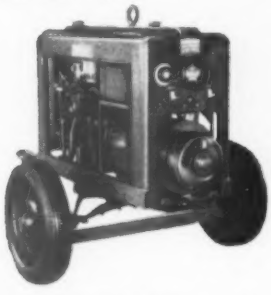
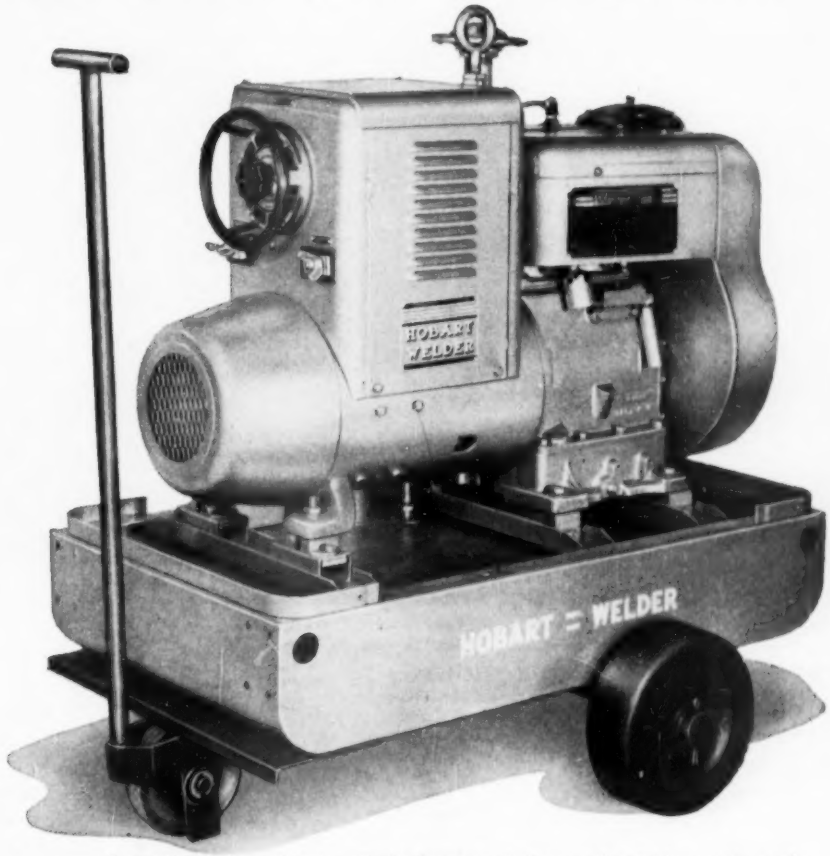
Electric Drive Welders. Ideal for production, maintenance and repair welding, in both large and small plants. 200, 300, 400 and 600 amp. models.

Gas Drive Welders. Used in the field where electric power is not available. 1, 3 or 12 KW auxil. power outlets. 200, 300, 400, 600 amp. models.



"Pipeliner" Welder. A 250 amp. Gas Drive model that's light and compact—yet has plenty of engine power and a hot, fast, dependable arc.

The neatest package of welding energy you ever saw. This 200 amp. **Hobart "Husky Boy" air-cooled engine driven welder** has plenty of copper **(not skimped).** Gives you rapid and strong welds at lower cost. **Light but rugged** and compact. **Welds anywhere!**



Specially designed to handle both general shop and outside repair work, the "Husky Boy" is a real profit-maker. Mail coupon today for full details.

Hobart BROTHERS CO., Box U-14, Troy, Ohio

Phone 21223—"One of the world's largest builders of arc welders"

Make your own comparison

Try Hobart Electrodes on your work to actually see the difference. Convince yourself of their superiority. Just tell us the type work you are doing and we'll send you **FREE** samples that your men can try. Mail coupon today!

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☐ Check here for Booklet— "How To Get Better Welds"

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Without obligation, please send complete information on items checked below.

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☐ "Pipeliner" Welder *Send me:* ☐ Electrode Catalog ☐ Accessory Catalog

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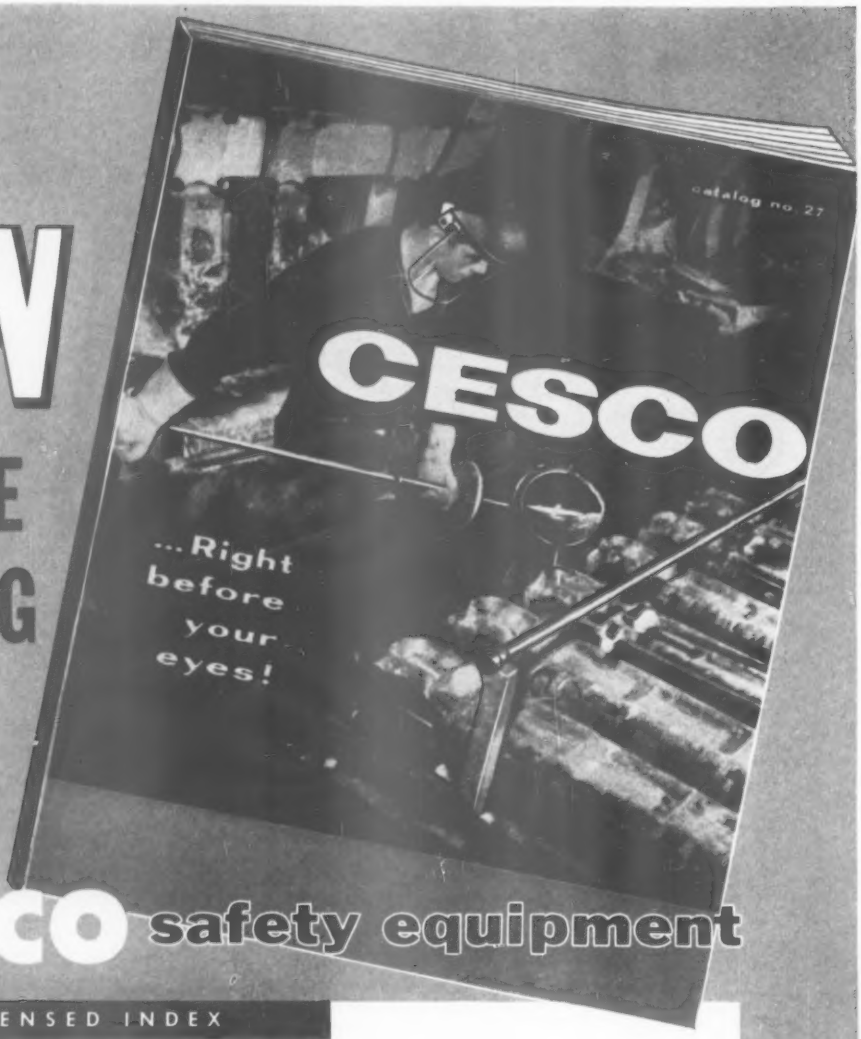

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JANUARY, 1954

Cover: *Pressure-welded rails running an S-curve along the Clark Fork River in Montana. Train of 55 open-end ballast cars carried eight half-mile lengths of welded rail. See page 32. Photo courtesy Northern Pacific Railway.*

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NEW

QUALITY JACKSON PRODUCTS

This new holder should be your choice for welding jobs in the 250-amp range . . . a holder light as possible, yet rugged enough to withstand unavoidable rough usage.

The same heat treated 98% copper alloy that made Jackson's larger holders come out on top when tested for strength, hardness and conductivity is used in this model.

We rate its capacity at 250 amps, recommend it for electrodes 1/16 through 7/32 inch. Cables, no larger than No. 1/0, may be soldered or brazed, and cables through No. 1 may be clamped in place.

Built along the lines of Jackson's Featherlight Model AW (most parts are identical), it fits like a glove, is easy to operate.

ANOTHER FIRST! Newly developed thermal-setting material for Jackson jaw insulators represents the latest advance in greater impact strength at the holder's most vulnerable points.

PRICE $5.00 lower in quantity

JACKSON HOLDER MODEL AW-C

Sold World-Wide through Distributors and Dealers

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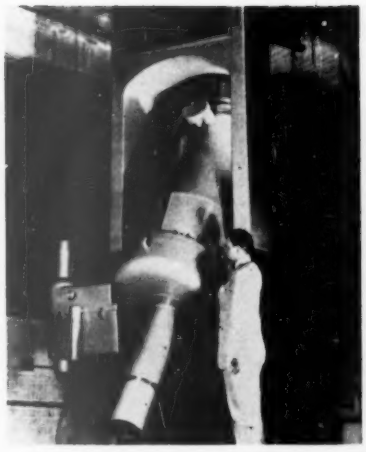
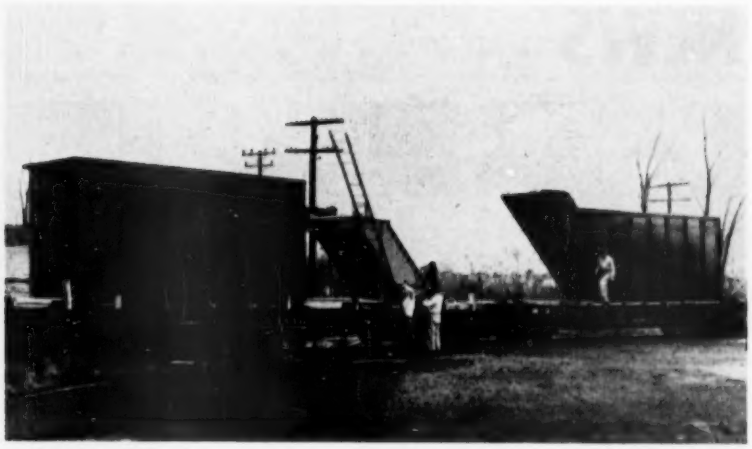


X-RAY can penetrate 12-in. steel



COOLANT tank shipped to automobile manufacturer will clean quench oils

NEWS

Van de Graaf Generator on 2,000,000-Volt X-Ray

AN X-ray generator capable of penetrating steel as thick as 12 in. is one of the major tools used in the manufacture of pressure vessels in the new Foster Wheeler Corp. plant at Mountaintop, Pa., nine miles south of Wilkes-Barre. A 2,000,000-volt charge for X-ray inspection is provided by a Van de Graaf generator. This new machine is said to be the first supervoltage machine of its type to be installed for use in industrial radiography. It will radiograph weld metal with great clarity of detail.

In operation, the generator continuously transfers the electric charge into an insulated hemisphere by means of a rapidly moving, endless belt. A glass-and-metal tube, under high vacuum internally, is mounted between the high-voltage hemisphere and the base of the X-ray unit. Inside this tube, electrons are accelerated by the high voltage to very high speeds, only to be stopped by a thick gold plate. It is the impact against the target that produces the X-rays of high penetration.

The unit was made by High Voltage Engineering Corp., Cambridge, Mass. It is housed separately in a massive concrete structure to insure safety of plant personnel.

Automatic twin welders capable of welding plate 8 in. thick at speeds considerably faster than single electrode welders are another major fabricating tool at the new plant. Built to Foster Wheeler's specifications by Cecil Peck Co. and The Lincoln Electric Co., both of Cleveland, these machines are power driven and rest on bases that can be elevated to accommodate vessels up to 12 ft in diameter. The units also travel on a 150-ft track.

Convention Calendar

Jan. 13-15: **Second Annual Welding Applications Institute, University of Wisconsin, Madison.**

Feb. 15-17: **National Welding Supply Association, tenth annual convention, Fairmont Hotel, San Francisco.**

April 7-9: **International Acetylene Association, 54th annual convention, Palmer House Hotel, Chicago.**

May 4-7: **American Welding Society, spring technical meeting, Statler Hotel, Buffalo.**

May 5-8: **Welding and Allied Industry Exposition, Memorial Auditorium, Buffalo.**

Nov. 1-5: **American Welding Society, 35th annual meeting, Sherman Hotel, Chicago, and 36th National Metal Congress and Exposition, International Amphitheatre, Chicago.**

Ford Gets World's Largest Coolant Tank

THE world's largest industrial coolant tank was shipped last month to the Ford Motor Co. forge plant at Canton, O., where it will be used to reclarify quench oils. The tank itself it a one-piece welded steel unit and was built by United States Hoffman Machinery Corp., Syracuse. It has an 18,000-gal capacity. In addition to the tank, the separator includes a sludge-scraper mechanism and a magnetic plate.

* * *

Resistance-Welding Sales Held Up Well in 1953

TOTAL sales for 1953 in the resistance-welding industry were about even with those in 1952. Although defense business fell off last year, civilian purchases helped to offset the reduction, according to the Business and Defense Service Administration. Backlog orders, however, have dropped about 50% from the peak.

* * *

New Welding Supply Firm in Wisconsin

A NEW welding supply firm has been formed in Green Bay, Wis. Incorporators are Early C. Peters and Norman J. Peters. The new distributorship is known as Peters Welders' Supply Co., Inc., and is located at 445 S. Jackson St.

* * *

New Offices for Pipe Welding Bureau

THE Heating, Piping and Air Conditioning Contractors National Association and the National Certified Pipe Welding Bureau have moved their offices to Suite 1843, 30 Rockefeller Plaza, New York City 20.

NEWS

from page 5

Courtesy Aluminum Co. of America

SCENE from new color movie on welding of aluminum

Courtesy Baldwin-Lima-Hamilton Corp.

MACHINE improved ease of testing flash-butt welds

Alcoa Offers Color Movie on Welding

LATEST techniques in welding aluminum pressure vessels are demonstrated in a new color film available from Aluminum Co. of America. The 16-mm film runs 28 minutes and is entitled "Welding Advances with Aluminum."

It describes the welding of aluminum by both Tig (tungsten inert-gas) and Mig (metal inert-gas) methods. The basic concepts of both methods are explained in an animated sequence.

Request for prints of the film, which can be borrowed for group showings, should be made on business letterhead to: Motion Picture Section, 818 Alcoa Bldg., Pittsburgh 19, Pa.

* * *

99 Persons at NWSA Kansas City Meeting

THREE applications for membership were received at the West Central Zone meeting of the National Welding Supply Association, held Nov. 12-13 in Kansas City, Mo. Ninety-nine distributors and manufacturers were in attendance. The applicants were: The Kacena Co., Cedar Rapids, Iowa; Newkirk Sales & Service Co., Waterloo, Iowa; Wright Welding Supply Co., Des Moines, Iowa.

Zone Vice-President Marcel L. Lampton, of Lampton Welding Supply Co., conducted the meeting. President William A. Rice, of Virginia Welding Supply Co., spoke on "The High Cost of Not Having Distribution." Director Allen H. Young, of Independent Distributing Co., addressed the gathering on the subject of operating costs.

Other speakers were H. C. Woodland and William Shaughnessy, of Addressograph-Multigraph Co.; W. K. Reed, of The Purchasing Agents Association and Black, Sivalls & Bryson, Inc.; Ralph A. Brenizer, of Dun & Bradstreet, Inc.; A. C. Gilbert, of Jackson Products, Inc.

Discussion periods were led by George O. Bland, of Hill Equipment Engineering Co.; Murl A. Green, of Northwest Oxy-Acetylene Dist. Co.; C. S. Rutherford, of R & R Welding Supply Co.

* * *

Lincoln's District Managers Meet in Cleveland Plant

DISTRICT managers of The Lincoln Electric Co. recently met at the Cleveland headquarters for three days. The purpose of the meeting was to show the 41 men from all sections of the country how new developments in welding equipment could be applied to reduce manufacturing and maintenance costs in the metal-working industry.

* * *

Tower Welding Co. Leases New Ship-Repair Facilities

DOCK space to service four ships at once has been acquired by Tower Welding Co., Cleveland, Cuyahoga River ship repair organization. It has leased the former American Ship Building Co. facilities in that city. Tower will occupy more than half a mile of dock space and hopes to install a new fabricating building, complete with crane equipment.

Flash Welds Tested by Hydraulic Machine

NUMEROUS parts for large aircraft landing gears are fabricated by The Cleveland Pneumatic Tool Co. by flash-butt welding lengths of steel tubing to mating drop forgings. The recent installation of a 1,000,000-lb. hydraulic testing machine has increased the size of such parts and has improved the ease of testing them. Weldments with cross-sectional areas up to 67 sq in. and with diameters up to 30 in. can be proof-tested in this machine.

The welded parts are given bend tests in four positions. Specially designed adjustable fixtures are used to hold the parts. Production testing of welds in landing-gear pistons is said to be fully justified by the advantages accruing from the use of flash-butt welding.

* * *

Gar Wood Firm Buys Uniflex Cable Co.

ANNOUNCEMENT was recently made of the purchase of Uniflex Cable Co., Detroit, by Gar Wood Industries' United Metal Craft Co. Uniflex products (welding cables and other secondary welding equipment) are now being manufactured at the Ypsilanti, Mich., plant of the Gar Wood firm.

John S. Wreford, Ernest Hoisington and Robert Bosman, who were with the old company, have become associated with the new Uniflex Cable Division, which will specialize in the design and building of secondary welding connectors for the resistance-welding industry.

(More News on page 68)

here's why this cutting tip lives longer . . .

a swift blow with a hammer restores cutting tip seat

and no other cutting tip is so fully protected against external damage, nor repaired so easily.

Internal instead of *external* cone seating surfaces make a great difference in cutting tip wearing ability. An external conical seat is exposed to every impact; internal seating surfaces are not.

Therefore — both the cutting torch head and the cutting tip seating surfaces of the *NATIONAL* torch are *hard to damage* and *easy to repair.*

And — most important of all — the NATIONAL cutting tips are built for the job they are intended to perform. Tips are available for every useful fuel gas, for every desirable flame-cutting job, in all encountered capacities. No other cutting tip will do so much work, so inexpensively, so dependably, so swiftly, and so well.

even the best cutting torches are inexpensive to buy . . . this one is less costly to keep on the job.

After all, even the best cutting torches cost but little to purchase; how much it costs to keep them on the job is the more important consideration . . .

How many cutting tips will be damaged—how many of them can be restored to full working order—how often does the torch need a trip to the repair man—does it waste or conserve gases—these are among the important questions asked by the purchaser.

And these are the reasons why we talk so much about "internal" rather than "external" conical seating of cutting tips; this is why we emphasize repairability.

. . . no other cutting tip can be reconditioned so easily

Made by National SINCE 1910 **WELDING EQUIPMENT CO.,** San Francisco 5, California

NEMA-rated at 200 amps.

—but pulls 300 amps.!

Runs all day on one tank of gas!

New P&H WN-250 Engine-Driven

Here you get everything you've ever wanted in an engine-driven welder — including features you don't get from any other.

Take a quick look at some of the WN-250 advantages that help you keep step with demanding production schedules; help you cut costs:

(1) The P&H WN-250 has more capacity than other welders with the same rating.

(2) It has a full 20-gallon gas tank.

(3) It gives you the latest-type P&H welding generator, powered by a direct-connected gasoline engine. It's a four-cylinder, 180GLU Waukesha, water-cooled and built for heavy duty. And we really mean *heavy* duty — it's not an automotive light-weight. Available with electric starter.

(4) The WN-250 is equipped with a P&H idling device that establishes the rated speed of 1800 rpm as soon as the arc is struck. This speed is maintained for a set period after the arc is broken.

(5) It has P&H's famous Dial-lectric Control. An easy turn of a radio-type knob provides stepless heat adjustment over the entire high or low range.

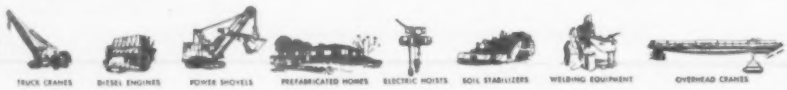
(6) It has pre-lubricated bearings, to reduce the need for servicing and insure longer life.

(7) It has an auxiliary AC power supply (1KVA) that permits floodlighting and running power tools, while welding.

There are other reasons why you're money ahead with a P&H WN-250. Ask your P&H representative or distributor for all the facts. Or, write for bulletin.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4513 West National Avenue • MILWAUKEE 46, WIS.

the P&H Line



Both engine and generator are mounted on a sturdy frame. Two-wheel mounting also available.

Arc Welder

America's most complete line of Arc-welding equipment and electrodes

Continuous 8-hour welding test demonstrates the extra stamina of the P & H WN-250

You can't beat welding performance like this: In a recent test, the P&H WN-250 operated continuously for 8 hours on a 70% duty cycle.

A 5/32" electrode was used with 300 feet of cable. There were 250 amps. at the electrode. So that the test would be continuous, three welding operators were used. When one got tired, another took over. All used the drag technique with a 6010 rod — which is as close to a short circuit as you can get.

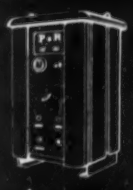
At the end of 8 hours, the P&H generator was still cool. And the WN-250 was still rarin' to go — the weldors were worn out, but not the machine.

P&H AC WELDER

A full range of sizes up to 625 amps. (NEMA-rated). All are connectable to 220 or 440 volts. Dial-lectric Instantaneous Remote Control is fingertip control — gives you any heat you want—right at the work.

P&H DC RECTIFIER WELDER

Three sizes — 200, 300, and 500 amps. (NEMA-rated). No moving coils — no bearings, brushes, commutator, brush riggings, etc. Dial-lectric Control gives you finger-tip heat-control at the work.



P&H POSITIONERS

One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote control and hand operated models.

P&H ELECTRODES

A type and size for every job — to give you cleaner, sounder welds at lower cost on mild steel, cast iron, "hard-to-weld" steels, stainless steels, or hard surfacing.

P&H Welding equipment is manufactured and sold in Canada by

REGENT EQUIPMENT MANUFACTURING COMPANY LTD.

455 King Street • West Toronto, Ontario, Canada

Job-Matched PREST-O-LITE Torches

for every soldering, heating, and brazing need

CONVENIENT

•

CLEAN . . . FAST

•

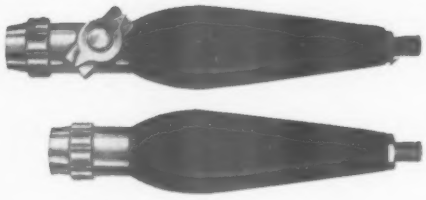
ECONOMICAL

Whatever your soldering, heating, and brazing needs, there's a PREST-O-LITE outfit to meet your exact requirements. Because you "tailor-make" your own outfit. You choose the torch handle, stems, and accessories you need. And you buy only what you need for the work you want to do—no "extras."

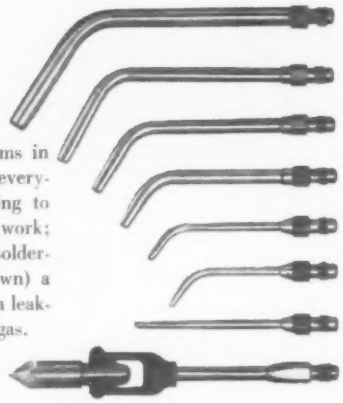
PREST-O-LITE outfits, burning acetylene from small portable tanks, are lightweight and completely portable. A painter on a scaffold "burns" paint with his outfit as easily as any plumber in a cellar "sweats" a joint with his. Outdoors, the air-acetylene flame lights instantly at full working heat regardless of wind and weather. Indoors, it burns clean, without smoke or fumes. And there's no liquid fuel to spill—no pumping, priming, or warmup to waste time.

Electricians, autobody repairmen, radio and television men — practically all installation and maintenance men—are finding new time- and moneysaving uses for PREST-O-LITE torches every day. Refrigeration engineers find the PREST-O-LITE Leak Detector an indispensable tool in their kit. For further information, see your local LINDE jobber today, or write to LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Dominion Oxygen Company, Limited, Toronto.

Get it from Your LINDE Jobber



YOUR CHOICE of standard torch handle or precision model with gas-saving shutoff valve and built-in pilot flame control. All stems fit interchangeably on either handle.



YOUR CHOICE
of seven open-flame stems in job-matched sizes for everything from heavy heating to fine, electrical soldering work; pointed or chisel type soldering irons; and (not shown) a paint burning stem and a leak-detector for refrigerant gas.

YOUR CHOICE
of MC Tank (10 cu. ft.) or B Tank (40 cu. ft.) containing acetylene for up to 160 operating hours, depending on size of torch stem. Empties immediately exchangeable for full tanks at cost of gas only.

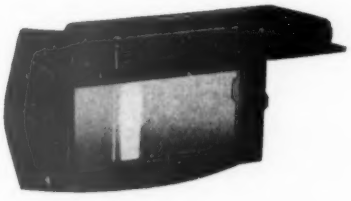
FOR PEAK EFFICIENCY
Fully adjustable R-411 regulator automatically maintains gas flow at precise pressure for best results on each job. Eliminates work interruptions for frequent readjustment of tank valve as tank empties. Also saves gas by preventing use of excessive pressures.

Complete Outfits, less tank, start as low as **$7.45.**

The term "Prest-O-Lite" is a registered trade-mark of Union Carbide and Carbon Corporation.

Announcing the NEW amazing SELLSTROM *Fiber Glass* WELDING HELMET

Because of its greater strength and water resistance, the new Sellstrom No. 230 Fiber Glass Helmet should outlast 5 ordinary fiber helmets.
It is available with either the Standard Front Loading Plate Holder, as shown above, or the new "S" Lift Front Plate Holder shown below.



Your Choice of Headgear

The Sellstrom No. 230 Fiber Glass Helmet may be fitted with either the Standard Headgear No. WMXK shown above or the new Sel-O-Matic "M" model headgear shown at the right — which can be easily adjusted with one hand while the helmet is on the head.

The only helmet with these advanced features

1. 400% Stronger Than Ordinary Helmet
An 8 ounce steel ball, dropped from a height of 5 feet onto the Sellstrom Fiber Glass Welding Helmet, merely bounced from the helmet. The same ball, dropped from the same height onto an ordinary fiber helmet, cracked it.

2. A Better Insulator from Heat
Made of Fiber Glass, the perfect insulator, this Sellstrom Helmet transmits less heat than ordinary helmet — keeps face cooler.

3. More Resistant to Moisture
After immersion for 48 hours in salt solution of 160°F., the Fiber Glass Helmet absorbed less than ½ ounce of moisture. Holds its shape indefinitely.

4. Lightest Helmet of Its Kind

5. Choice of Plate Holders and Headgear

TEST A SAMPLE — Satisfaction Guaranteed!

Let us ship you a sample Sellstrom No. 230 Fiber Glass Helmet equipped with the famous Sel-O-Matic headgear and the new "Lift Front" plate holder on a 30 day memo, with the understanding that if you are not entirely satisfied, you can return it for credit. We will also give you the name and address of a nearby dealer who can supply your future requirements. The price — no higher than for an ordinary quality helmet. Send for your sample today!

Ask your dealer or write us for a copy of this 60 page buying guide to more than 300 Eye and Face Safeguards.

Mr. Dealer: The interchangeability of headgears and plate holders for this new Sellstrom Fiber Glass helmet means maximum profit and minimum inventory for you. Write for details!

sellstrom safeguards

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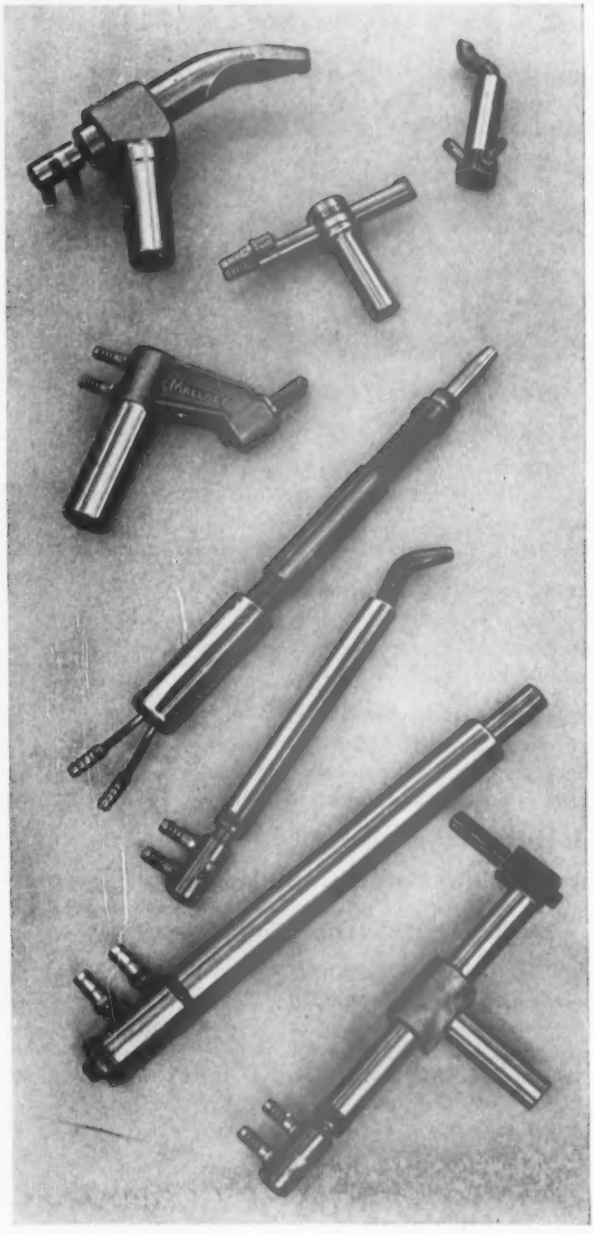
No Job is a "Special"...



with Mallory Resistance Welding Holders and Electrodes

Welding pressures from under 100 pounds to over 6000 pounds can be handled by standard Mallory holders and electrodes... available from stock.

In addition, holders and electrodes are available in such a wide variety of shapes and designs that standard units can be combined in an almost infinite number of combinations. Practically any resistance welding job can be done without the cost or delay of special designs.

The Mallory line is the result of over 25 years of experience in the development of special alloys and a complete range of designs. Write us, or ask your distributor, for the new Mallory Catalog. See for yourself the complete line of holders, electrodes, rods & bars, dies, castings, forgings, and accessories that are on the shelf for immediate delivery.

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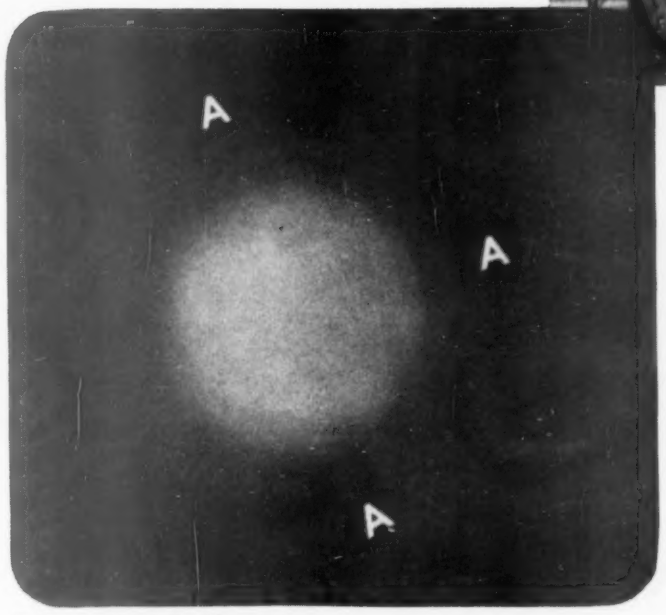


Radiograph of repair weld

SAVED...

66⅔% in cost, 75% in time— because

RADIOGRAPHY proved welds sound

Cracks showed up in the shell of this stainless steel sphere. A new one would cost plenty—take priceless time.

But since radiography could prove welds sound and in conformance with code, stainless patches were welded in. The sphere went back to work in one fourth the time and at one third the cost of a new replacement. This is the way radiography helps extend the use of welding and widen opportunities for welders.

Wouldn't you like to know how it can help you increase your business? Get in touch with your x-ray dealer and talk it over.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography—
another important function of photography

Kodak
TRADE MARK

New G-E Fillerarc Equipment Widely Acclaimed by Industry

Dependable, low-cost operation and wider application praised in new consumable electrode gas-shielded welding equipment

Demand for new G-E Fillerarc equipment for consumable electrode gas-shielded welding is the greatest in G-E Welding history. At the Metals Show, at G-E Distributor demonstrations, and in customer plants, Fillerarc equipment has proved its merit as the leading equipment for this high-speed process.

BURN-BACK AND STUBBING MINIMIZED

Of course customers are amazed by the high speeds of Fillerarc equipment and by how fast operators pick up Fillerarc technique. But their greatest praise is for reduction of burn-back and stubbing problems which plagued operators of other equipment.

WELDER, GUN, WIRE-DRIVE FORM PACKAGE

Ease of operation and minimum trouble are built-in features of new Fillerarc equipment. Here's why:

Fillerarc Welder has a self-regulating generator with a rising volt-ampere characteristic which maintains desired arc length automatically. What's more, you can change wire speed even while you are welding and the current is always right.

Fillerarc Gun pulls wire into gun, permitting the use of smaller wire. Result: you can weld thinner sections than ever before possible.

Fillerarc Wire-drive is powered by a Thy-mo-trol* drive and dynamically braked to give you precise wire-feed control. Dial gives continuous wire-speed indication—no need to time and measure.

If you haven't yet seen Fillerarc equipment in action, contact your G-E Welding Distributor today. He can give you full data and arrange a demonstration. He's listed here and in the yellow pages of your phone book under "Welding Equipment—General Electric." General Electric Co., Schenectady 5, N.Y.

*Reg. Trade-mark of General Electric Company 710-15

***P. S.:** Your G-E Welding Distributor can furnish filler wire for this process. Ask him for a quotation to your specifications.*

Now—a Plastic Ventilated Helmet

The famous G-E ventilated helmet is now available in plastic to give you the last word in comfort, convenience, and long life.

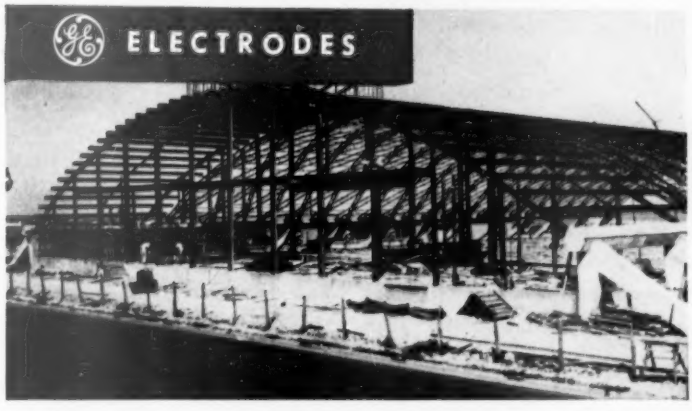
FOR YOUR COMFORT

- G.E.'s famous ventilated design provides a cool head on the job.
- Moisture-proof headgear assumes head shape exactly—but won't warp.
- Ratchet-type device makes exact head-size adjustment simple.
- New four-position stop meets vertical and overhead needs, too.

FOR LONG LIFE

- Seamless plastic construction has excellent strength.
- Plastic shell is moisture-proof and heat-resistant.

Avoid fatigue, get real comfort and convenience on the job with the new **G-E** plastic ventilated helmet —lift-front or stationary type.



Columbia Iron Works Selects W-612A

In choosing an electrode for shop-welding structural roof joists, Columbia Iron Works of St. Louis was looking for the best available combination of weld quality, speed, and usability.

After tests, they selected G-E Type W-612A electrodes as tops for this job. Columbia is mighty pleased with the results, too, because W-612A helped them complete delivery in 20% less time than originally estimated.

This successful application of W-612A—one of more than 70 arc-welding electrodes supplied by G.E.—is another example of "balanced electrode design for best over-all results."

You'll Find the Best Electrode for Your Job in the G-E Line—Most Complete in the Industry

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Alabama: Birmingham—Alabama Oxygen, Young & Vann Supply; Mobile—Turner Supply

Arizona: Phoenix—Consolidated Welding Supply

California: Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Francisco, Ventura—Victor Equipment

Colorado: Boulder, Colorado Springs, Denver, Durango, Ft. Collins, Ft. Morgan, Greeley, LaJunta, Longmont, Pueblo, Sterling—Hendrie & Bolthoff

Connecticut: Hartford, New Haven—Harris Sales & Service

Florida: Hollywood—Florida Gas & Chemical

Georgia: Atlanta, Macon—Welding Supply & Service; Augusta—Marks Oxygen; Columbus—Williams Welding Supplies

Idaho: Boise—Olson Manufacturing

Illinois: Chicago, Moline, Morton, Rockford—Machinery & Welder

Indiana: Evansville—Drillmaster Supply; Ft. Wayne, Indianapolis—Sutton-Garten; South Bend—Perry Welding Sales & Service

Iowa: Des Moines—Machinery & Welder

Kansas: Hutchinson—Kopper Supply

Kentucky: Louisville—Reliable Welding; Paducah—Henry A. Petter Supply

Louisiana: Alexandria, Shreveport—Hughes Oxygen; New Orleans—Consolidated Welding Supplies

Maryland: Baltimore—Arcway Equipment

Massachusetts: Boston—New England G-E Welding Sales Division

Michigan: Detroit—Welding Sales & Engineering; Grand Rapids—Miller Welding Supply

Minnesota: Duluth—W.P.&R.S. Mars; St. Paul—Production Materials

Mississippi: Jackson—Jackson Welding & Supply

Missouri: Kansas City—Hohenschild Welders Supply; St. Louis—Machinery & Welder

Montana: Billings—Valley Welders Supply; Billings, Bozeman, Cut Bank, Glasgow, Great Falls, Havre, Kalispell, Miles City, Shelby, Sidney, Whitefish—Valley Motor Supply; Butte, Great Falls—Montana Hardware

Nebraska: Lincoln—Lincoln Welding & Supply; Omaha—Baum Iron

New Jersey: Kenilworth—Welding Sales Corp.

New Mexico: Albuquerque—Industrial Supply Co., Hobbs—Western Oxygen; Las Cruces, Silver City—Car Parts Depot, Inc.

New York: Buffalo—Welding Equipment Sales; New York—Welding Sales Corp.; Syracuse—Welding Engineering & Equip.

North Carolina: Charlotte—Dixie Gases; Gastonia—Gastonia Motor Parts

North Dakota: Bismarck, Fargo—Acme Welding Supply

Ohio: Akron, Cincinnati, Cleveland, Columbus, Dayton, Mansfield—Burdett Oxygen; Toledo—Odland Iron Works

Oklahoma: Tulsa—G-E Welding Sales Division

Oregon: Eugene, Portland—J. E. Haseltine; Medford, Portland—Industrial Air Products

Pennsylvania: Allentown, Philadelphia, Pittsburgh—Arcway Equipment

South Carolina: Columbia, Greenville—Welding Gas Products

South Dakota: Deadwood—Hendrie & Bolthoff

Tennessee: Chattanooga, Knoxville, Nashville—Welding Gas Products; Memphis—Delta Oxygen

Texas: Abilene—M&M Welding Supply; Alice, Corpus Christi—Crane Welding Supply; Alpine, El Paso, Marfa, Pecos—Car Parts Depot; Amarillo—Welding Equipment & Supply; Brownsville, Harlingen—Acetylene Oxygen; Dallas—Hill Equipment & Supply; Hereford—Tex-Air Gas; Houston—G-E Welding Sales Division; Lubbock—Welders Supply of Lubbock; Midland—West Texas Welders Supply; Odessa, Pecos—Western Oxygen; Pecos—Welding Supply Co.; Plainview—Plains Welding Supply; San Angelo—Southwestern Welding Supply; Texarkana—Hughes Oxygen; Wichita Falls—Nortex Welding Supply

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GENERAL ELECTRIC

BIG WHEEL

This 37-ton wheel, a product of our Weldment Shop, is the first of four counterweight sheaves for the new vertical-lift bridge between Queens and Welfare Island, New York. Husky cables, passing over the sheaves, will carry two 515-ton counterweights for raising and lowering the lift span.

Heaviest component of this sheave is the rolled plate rim, 6 in. thick and 3 ft wide. It is made of two plates which were cold-formed into semi-circular shape, then butt-welded together to form a complete circle. Into this ring of steel we securely welded the sturdy web section, with its forged and center-bored hub.

Machining of cable grooves in 25-ft vertical boring mill. Bethlehem is equipped to machine any weldment to your specifications.

After welding, the sheave was heat-treated to relieve possible stresses, then moved to the machine shop for finish-machining and cutting of the cable grooves.

This wheel is a large weldment, but is well within the range our Weldment Shop is used to handling, which includes jobs of all sizes and types; from huge and complex presses, kilns and autoclaves, to smaller and simpler pipe work, vessels and machine parts.

Whatever kind of job you may have in mind, we can probably cut your manufacturing costs by trimming excess weight – without sacrificing strength or rigidity.

You can avoid design limitations with Bethlehem Weldments. We can bend, press, shape and flame-cut the rolled steel plates prior to welding, and incorporate forgings, castings and structural shapes, if required. Any necessary machining operations are ably handled in our well-equipped machine shops.

Next time you require a machine part or finished assembly, we suggest that you consider the advantages of Bethlehem Weldments. The nearest Bethlehem office will gladly furnish further information.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM WELDMENTS

BETHLEHEM STEEL

DEPENDABLE

SAFE

ACCURATE

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CONSTANT PRESSURE
OXY-ACETYLENE
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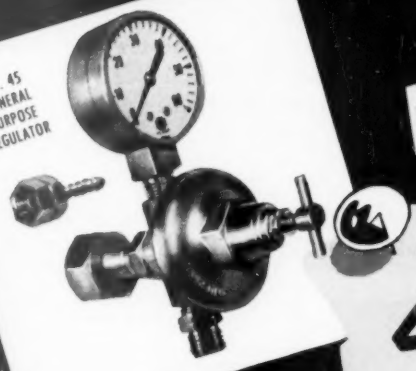
INDUSTRIAL
REGULATOR



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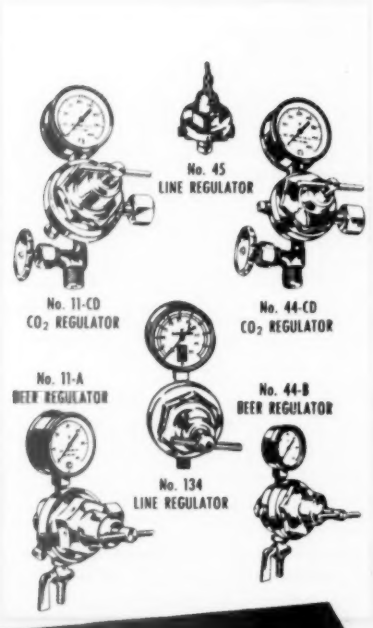
PURPOSE
REGULATOR

Dockson REGULATORS are *Built for Better Service!*



Over 30 years of constant field and laboratory testing assure you of a functionally designed, carefully manufactured, low-cost regulator.

Dockson "Better-Built" Regulators incorporate ALL the features you have asked for—heavy-duty, forged brass bodies; a minimum of moving parts; self-aligning, easily replaceable seats; extremely sensitive, sturdy metal diaphragm that works with—instead of against—incoming pressure; dependable safety valves against excess pressure; and shatterproof gauges.

All Dockson Regulators are GUARANTEED for one year against any defect in material or workmanship in the regulator proper.

Whatever your regulator needs are—acetylene, CO_2, air, fuel gases or water—you can rely on Dockson.

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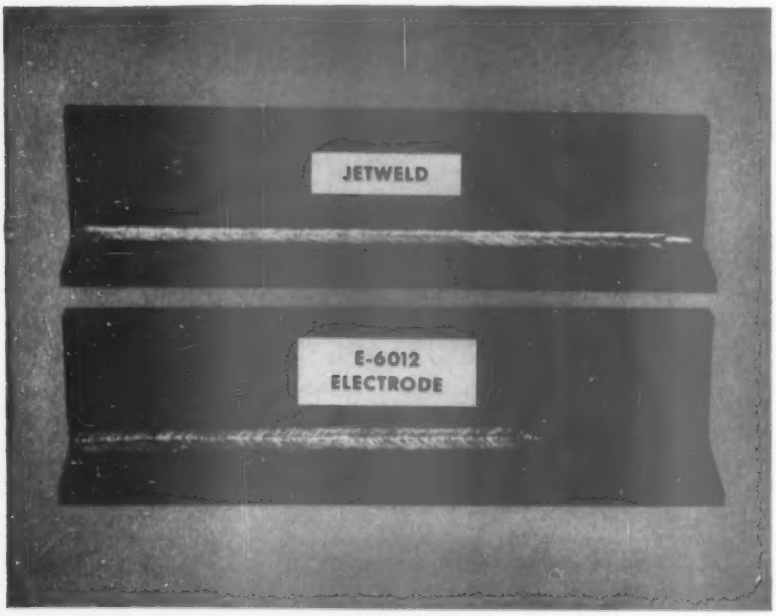
IT TAKES SPEED

to *really* cut welding costs

HERE ARE THE FACTS! 86¢ out of every welding dollar goes for labor and overhead. Obviously, the most effective way to cut welding costs is to boost welding speeds. This is exactly what you accomplish by using the *right* Lincoln electrode for your welding job. Each Lincoln electrode is designed to do a *specific type of job* . . . do it faster because Lincoln has higher *useable* melt-off rates to give more footage than possible with other makes. This actual test proves the *extra speed* you get with Lincoln electrodes.

TEST OBJECTIVE: To compare the welding speed of Jetweld with the best other make E-6012 electrode in horizontal fillets.



	LINCOLN JETWELD	THE FASTEST E-6012 ELECTRODE
PLATE SIZE	3/8"	3/8"
FILLET SIZE GAUGE	1/4"	1/4"
ELECTRODE SIZE	5/32"	1/4"
CURRENT AMPS.	275 AC	350 AC
ARC SPEED INCHES PER MINUTE	15.0	11.0
DEPOSITION RATE—POUNDS PER MINUTE	.140	.135

LINCOLN JETWELD IS 36% *FASTER* IN THIS SPECIFIC APPLICATION

INVESTIGATE WHICH COST-CUTTING COMBINATION OF THESE LINCOLN ELECTRODES IS BEST FOR YOU

- For flat and horizontal fillets — high-speed, self-cleaning, submerged-arc-like appearance . . . *JETWELD.*
- For welds having poor fit-up. All positions—E-6012 . . . *FLEETWELD 7.*
- Soft arc action, easy-cleaning welds. All positions —E-6013 . . . *FLEETWELD 47.*
- High-speed production welding of lap and fillet welds. E-6012 . . . *FLEETWELD 72.*
- For deep penetration, structural and pipe welding butt and fillet welds in flat, vertical, and overhead positions . . . *FLEETWELD 5.*

GET THE FACTS. ***Speeds and procedures for mild steel electrodes are in Bulletin 462, available by writing on your letterhead.***

THE LINCOLN ELECTRIC COMPANY
DEPT. 1713, CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

ESTABLISHED 1916

THE WELDING ENGINEER

JANUARY, 1954

Don't Holler! You May Not Be Hurt

TO THE CHRONIC grouch and pessimist, the New Year offers little hope. These doleful individuals (and there seem to be many of them) are standing around wringing their hands and wondering what to do about the depression that is sure to come. In their timid little minds there is ample proof that depression will come, for aren't farm prices down, unemployment up, industrial output off and the cost of living up?

The prophets of gloom and doom are right on every count. It is true that farm prices are down, unemployment is up, industrial output has fallen and the cost of living has soared sky high. But wait a minute before you go out and shoot yourself.

What are the yardsticks that are being used to measure these factors? Let's review a little.

In December, 1952, the index of farm prices stood at 99.2. At the end of November, 1953, this same index read 93.8—a loss of 5.4 points or percents, whatever you want to call it. Even this low, however, is 5 points above where the index stood in February, 1950 (88.8). So things can't be too bad for the farmer. He will still be able to buy shoes—and welding machines, too.

LET'S take up unemployment now. Few if any bread lines have formed. There has not been a drastic increase in the number of people unemployed. The latest figure available, in October, 1953, was 1,162,000 unemployed. In December, 1951, there were 1,412,000. Even after our economy had been bolstered by the defense activities necessitated by the "police action" in Korea, there were 250,000 more people unemployed in December, 1951, than there are now. A year-and-half earlier than that, there were 4,684,000 people out of work.

When 62 out of every 63 available persons are gainfully employed, as they are at the present time, it is difficult to see how there can be much suffering from unemployment.

Well, what about industrial output? Look how the production index has dropped since Mr. Eisenhower took over in January, 1953. Yes, in that time the index has gone down from 234 to 232, which represents two points—less than 1%. Alarming? Well, in the fall of 1948, when Truman defeated Dewey, the production index stood at 195. A year later it had fallen to 161—down 34 points or 18%.

We hear an awful lot about the cost of living. The familiar argument is that it has soared so high that people won't be able to buy much of anything except food and shelter. Let's compare the cost-of-living index for October, 1952, with that for October, 1953. The rise was from 114.2 to 115.4. An increase of 1.2 points (1%) in a year doesn't sound too terrible when you consider the increases in rents, wages and other factors that materially influence the cost of living.

WHEN you look at the record, it appears that some of those who are busy crying "Depression" and "Hard times ahead" are deliberately putting out propaganda to fool the public. Or else they are taking a sort of perverse delight in scaring themselves to death.

A month or so ago an important industrialist told me how bad business was. "Why, it's so bad," he explained, "we have laid off half our salesmen."

It did not seem to me to be very logical to lay off salesmen when you need business, but perhaps the company's financial position was such that it had no alternative. I inquired just how bad he thought the year's total would be.

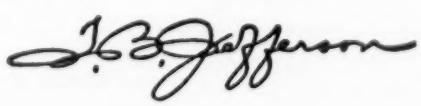
"We're not sure," he answered, "but it looks as though it may be off 5 to 10% from last year."

"Was last year (1952) such a bad year?"

"Why, I should say not!" he exclaimed. "That was the best year in the history of the company."

With five to ten per cent drop in prospect from the best year in the history of the company, this management thinks it necessary to lay off salesmen! How scared can you get? And how silly?

If we are stupid enough to run for cover every time somebody says, "Boo!" maybe we can talk ourselves into hard times. Instead of that, however, why don't we forget all the yak-yak about depression and just keep plugging away as we have always done?



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ACCURATE CONTROL AND MAXIMUM SAFETY

Accurate, long service VICTOR Safety Regulators are available for almost every use and gas, for delivery pressures up to 5,000 p. s. i., and flows to 50,000 c. f. h. Simplicity of design makes for ease of maintenance at low cost.

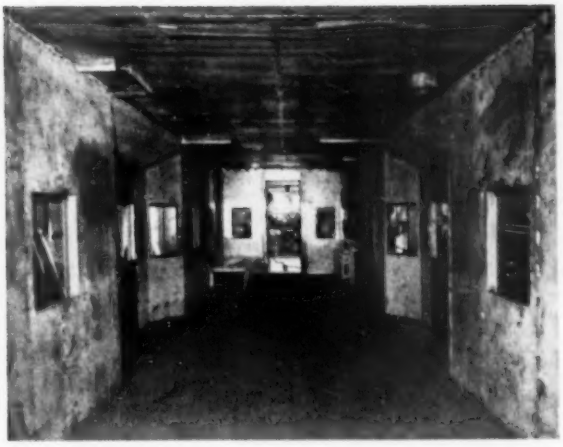
Look for the VICTOR dealer sign . . . ask him to show you how it pays to standardize on VICTOR welding and cutting apparatus.

VICTOR *Dealer Inquiries Invited*

for welding VICTOR EQUIPMENT COMPANY 4

3821 Santa Fe Ave. LOS ANGELES 58 | 844 Folsom Street SAN FRANCISCO 7 | 1312 W. Lake St. CHICAGO 7

DIMENSIONS of this caboose are: 32 ft 5 in. long, 8 ft 1¾ in. wide and 7 ft 2¾ in. high. It's a test case



STEEL panels for the ceiling and walls have been spot welded and are ready to be finished and painted

A Whole Carload of Spot Welds

Every caboose in the United States has a wooden interior—except one. In this one, the ceiling and walls are both made of 1/16-in. low-alloy steel sheets.

A CABOOSE having an interior sheathed by steel sheets has been completed and put into test runs by the Erie Railroad, Dunmore, Pa. The floor is of wood, as in other cabooses, but the ceiling and walls are of 1/16-in. low-alloy steel sheets. The car was constructed on an experimental basis with the thought that its construction would be cheaper and faster and that the finished job would stand up better than the wooden interiors of other freight-train cabooses.

TIG SPOT WELDING

The ceiling and wall panels were spot welded together and joined to supporting members by a tungsten inert-gas welding gun. Since this is arc, not resistance, spot welding, no ground connection is needed on the opposite side of the sheet from the weld.

The ceiling required eight sheets, each extending the full width of the car. These were backed up by carlings and purlins, which are ¼-in. 2 by 2 in. Z-bars. Prior to welding, the sheets were sandblasted on both sides, and the carlings and purlins were ground clean.

The ceiling sheets were lapped 2 in. and spot welded on 2-in. centers between spots. Spot welds were also made to join the sheets to the back-up members and to add molding strips along the edges of the ceiling.

The wall stiffeners were structural members similar to the carlings and purlins above the ceiling. Wall sheets were lapped about ¾ in., and the spot welds were spaced 6-in. center to center. On the ceiling and in the wall corners, ¾-in. molding was used; in the two bays, 1¼-in. molding.

The argon flow was 4 to 8 liters per minute, and the entire job consumed three cylinders of argon. The current setting was 200 amp on the ceiling and side sheets, 125 amp on the molding strips. A selenium-rectifier welder provided direct current.

It took only a second or two to make each of the hundreds of spot welds that were required on this car. All the weldor had to do was to press the muzzle of the gun against the work and squeeze the trigger. An automatic timer opened and closed the welding circuit. The argon shut-off valve, also automatic, did not close until several seconds after the welding action had stopped, permitting the tungsten electrode to cool off while fully shielded so that it would not oxidize.

Photos and data courtesy Linde Air Products Co.

HANDY gun makes a spot weld between corner molding and sheet

HOW the welds look at corners of the sheets at side and ceiling

TWO welds on side sheet, showing 6-in. center-to-center spacing

Stop Oxyacetylene

Though this article was slanted for the steel industry, it ought to be read by every user of gas welding and cutting equipment. Fires can and must be ended.

BY CARL SAACKE and R. L. DEILY*

DURING 1952, some 22,000,000,000 cu ft of oxygen and 3,000,000,000 cu ft of acetylene were produced for use in gas welding and cutting. In fabricating some 20,000,000 tons of steel during the same year, the steel industry is estimated to have consumed about 7,000,000,000 cu ft of oxygen and 1,000,000,000 cu ft of acetylene—about 30% of the total production.

In using these tremendous quantities of oxygen and acetylene, the steel industry has made an excellent safety record. Occasionally, however, the oxyacetylene torch is used improperly and a fire results. Neither gas cutting, gas welding nor arc welding is a major cause of fire in steel or other industries. The latest "Accident Facts" statistics report that of the 625,000 building fires recorded in the United States in 1951, less than 1% were due to either arc welding or oxyacetylene operations. Obviously, even these fires are preventable. The oxyacetylene torch itself is a safe tool, and accidents and injuries from equipment failures have been practically eliminated.

Ever since the French scientist Le Chatelier described the first oxyacetylene flame in 1890, the oxyacetylene industry and technical societies such as the International Acetylene Association have been preparing safety rules and have developed codes of safe practices that have been found to insure safety in oxyacetylene operations when followed rigidly. Some present-day oxyacetylene codes are:

International Acetylene Association: Safe Practices for Installation and Operation of Oxyacetylene Welding and Cutting Equipment.

Compressed Gas Association: Pamphlet P-1—Safe Handling of Compressed Gases.

American Welding Society and *American Standards Ass'n.*: ASA Standard Z 49.1-1950—Safety in Electric and Gas Welding and Cutting Operations.

These codes are prepared in detail and should be carefully studied by all concerned with welding and cutting.

Five Rules for Safety

Of the many safe practices listed, it is believed that the five rules listed at the top of the opposite page will be the most useful. We'll repeat them here:

1. Keep oxyacetylene equipment clean, free of oil and in good condition.

2. Avoid oxygen and acetylene leaks.

3. Open oxygen and acetylene valves slowly.

4. Purge oxygen and acetylene lines before lighting torch.

5. Keep heat, flames and sparks away from combustibles.

These five basic cautions cannot be substituted for the published safe practices of the various societies and technical associations. If faithfully followed, however, they will prevent the major portion of the accidents that might result from the misuse of the oxyacetylene equipment or processes.

The rules given herewith are brief, easy to remember and are based upon good practice and experience. They should serve as a foundation on which an operator can safely rely while he is learning the full story of safe practices from the more detailed codes and pamphlets. It is strongly urged, therefore, that these five safe practices be recognized as a minimum standard of procedure before permitting a novice to begin welding or cutting operations.

The first four cautions refer to the handling of oxyacetylene equipment. Although relatively few accidents occur annually with this equipment, it is only by respecting it and following these cautions that our relative freedom from accidents can be maintained.

The fifth caution refers to the use of the oxyacetylene flame. Since it is a source of ignition, it is doubly important that unnecessary risks be avoided. Let us now see why the observance of these safety rules will prevent most accidents involving oxyacetylene operations.

The Fire Triangle

The three elements that are necessary to produce a fire may be represented by a triangle (Fig. 1). To get a fire, you must have: (1) a fuel, (2) oxygen and (3) sufficient heat to raise the temperature of the fuel to the ignition temperature. The elimination of any side of the triangle prevents the fire.

Oxyacetylene equipment is designed and manufactured to combine these three elements and produce and maintain a controlled fire to serve useful purposes. The control may be weakened by leaks when hose is cut or burned, when hose couplings and

*Abstract of a paper presented to the metals section of the 41st National Safety Congress, Chicago, Oct. 19-23. Mr. Saacke is safety director of Air Reduction Co., Inc., and Mr. Deily is steel mill representative for Air Reduction Sales Co.

Fires

NOTE: Everyone having anything at all to do with welding or cutting should be compelled to memorize the simple rules given on the right. And then see that they are always followed.

Five Rules for Safety

1. Keep oxyacetylene equipment clean, free from oil and in good condition.
2. Avoid oxygen and acetylene leaks.
3. Open oxygen and acetylene valves slowly.
4. Purge oxygen and acetylene lines before you light torch.
5. Keep heat, flames and sparks away from combustibles.

torch or regulator connections are deformed, abraded or not properly tightened, or when diaphragms and regulator seats are allowed to age without replacement. So long as the cylinders, manifold piping, regulators, hose and torches are kept in good mechanical condition, however, adequate control of the oxygen and acetylene will be maintained and equipment fires cannot occur.

Keep Oil Away

Most of the material in oxyacetylene equipment is of non-combustible metal. Valve and regulator seats, diaphragms and packings and the rubber hoses are ordinarily of combustible materials. These materials, however, have high ignition temperatures and are so formed and positioned as to make ignition impossible if the equipment is used in accordance with instructions. Modern oxyacetylene equipment is safe when new despite the presence of combustible elements in its manufacture. However, it is advisable to avoid combustible contaminants that will either lower ignition temperature of the non-metallic parts or lower their resistance to ignition by acting as a fuse.

Filter screens are ordinarily provided in regulators to keep out solid contaminants. It is up to the user to keep the gas passages clean and free of oil, grease, soap, etc. In particular, oil and grease should never be allowed to contaminate oxygen equipment. Although the rate at which oil oxidizes is low, it could be heated to ignition temperature as the result of a flashback, friction or a sudden rise in pressure.

The manufacturer does not use oil on the valve stem of an oxygen cylinder valve or the adjusting screw of an oxygen regulator, and the weldor shouldn't either, even though he may have seen others do the same and get away with it. When the operator accepts the possibility of local high temperatures, he can be expected to do his share in keeping oxygen equipment clean and free of oil. Management can help by recognizing that the repair of oxyacetylene equipment requires oil-free equipment and oxygen-resistant materials and should be handled by qualified specialists.

1—FIRE triangle. Sides of the triangle represent the three elements a fire needs. Eliminate one side, and you prevent the fire

Danger! Oxygen

The hazards of an oxygen leak are less obvious than those from an acetylene leak. But oxygen can be dangerous, too.

Most people are familiar with the flammability of paper, wood, and oil in air. But air contains only 21% oxygen by volume. An oxyacetylene weldor may be familiar with the speed with which a jet of pure oxygen will "burn" steel, but even he does not always appreciate the increased flammability of clothing, wood, blankets, floors, etc., when they are in contact with pure oxygen.

Figure 2 shows very crudely the relative flammability of cloth in air and in oxygen, but no sketch can do justice to the intensity of combustion in pure oxygen. Pen and ink cannot show the ease with which otherwise non-flammable materials will burn in pure oxygen—the dazzling white heat of incandescence generated by the burning materials—the speed with which fire travels through combustibles in a pure oxygen atmosphere.

Oxygen leaks in a well ventilated room, in a large room or in the open are ordinarily not troublesome. Leaks into small enclosures such as a pit or a tank may rapidly develop high oxygen concentrations. In a small room or a shed, leaks in equipment connected to bulk oxygen supplies may also develop oxygen concentrations considerably in excess of the normal 21%. By preventing high oxygen concentrations in working areas, the possibility of a spark causing a sudden burst of flame in combustible building materials or clothing is eliminated. Hence this rule:

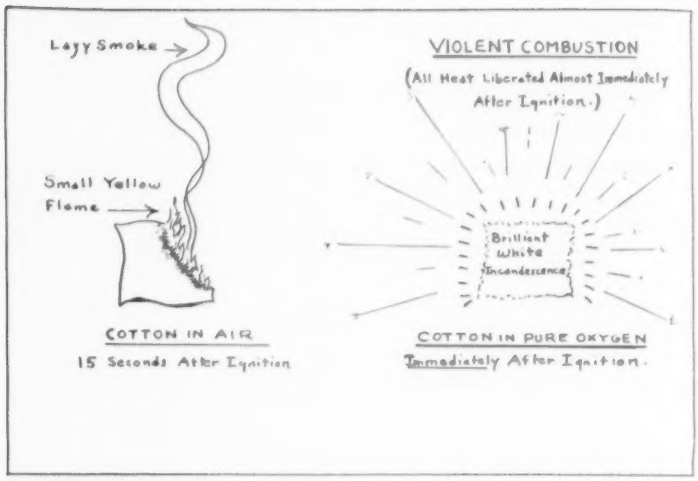
Avoid small enclosures around oxygen equipment. When inspecting or repairing oxygen equipment in a confined space, ventilate adequately.

Of course, circumstances have sometimes required living in an oxygen atmosphere. In hospitals, therapy with pure oxygen is often a necessity. However, a hospital bed can be readily kept free from flame-producing devices including smokers. Under these conditions, life in an oxygen atmosphere can be not only safe but beneficial.

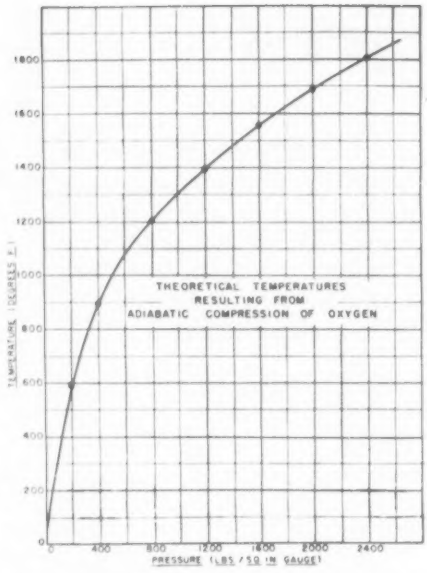
Leaks of Acetylene

Acetylene is a flammable gas, chosen for welding or cutting because when mixed with oxygen it produces the hottest flame known commercially to man. Remember this fact and respect acetylene accordingly.

Connection leaks are the most frequent, particularly at the regulator. Although cutting or welding opera-



2—RELATIVE flammability of cotton cloth in air and in oxygen is pictured by these sketches. Oxygen leaks can be a major fire hazard



3—COMPRESSING oxygen raises its temperature, as indicated by above curve

tions are directed away from the cylinders and regulators (or should be), an occasional spark may blow backward. To avoid any chance of fire, everything possible should be done to insure freedom from leaks at the connections.

The operator must inspect hoses often, particularly hose that has been dragged over sharp edges, laid under or near cutting operations or run over by lift trucks or automobiles. Sometimes the cuts, gouges, burns, or badly worn sections are overlooked because they have been bandaged with friction tape. Hoses must be discarded when they show appreciable deterioration near the regulator and torch connections and when they develop objectionable surface checks from service use.

When acetylene cylinders are moved outdoors over rough ground without a hand truck, the operator should check the fuse plug in the base of each cylinder for possible leaks. Two other things: an operator should not loosen the valve packing nut to make the cylinder valve stem easier to turn and under no circumstances should he remove the valve packing nut because he has forgotten his acetylene valve key and wants to turn the stem with a wrench.

Check for leaks daily or when connecting up. Soapy water is best for testing for leaks. When you find a leak, avoid overtightening connections. Most leaks are caused by abuse or dirt, and the part should either be repaired or the connection taken apart and cleaned before retightening.

Cylinders and Regulators

Valves in oxyacetylene equipment are opened slowly to prevent the development of high temperatures, which can come from friction, from the heat of compression at high pressures and from the chattering of regulators at excessive flows.

When a high pressure gas valve is quickly opened, the gas in the regulator chamber is rapidly compressed to a higher pressure. The temperature of a gas being compressed is raised. If it were not for the cooling effects of pipe walls and turbulent mixing with cool gas, the maximum temperatures that could develop with oxygen would be in accordance with Fig. 3, and would show 1,750 F at 2,200 psi. Fortunately, the temperatures on the curve are theoretical temperatures. The actual maximum temperatures attained are considerably lower and are of short duration.

To insure that the ignition temperatures will not be reached, regulator seats and diaphragms are made of ignition-resistant materials. Furthermore, they are so positioned and protected that their ignition temperatures cannot be reached in normal service. To maintain this resistance to ignition, the cylinder valve outlet and regulator inlet must be kept free from small pieces of lint, combustible fibres, particles of soap or drops of oil or grease. It is good practice to clean or even replace the high-pressure regulator seat whenever the high-pressure stage of the regulator is being serviced.

Most oxyacetylene regulators are designed to function as pressure regulators rather than as flow regulators. At a given pressure setting, the flow that a regulator will deliver depends upon the downstream pressure. When the regulator is delivering into an empty line of large capacity, the flow can be very large. Under such conditions, the pressure setting should be raised gradually to avoid delivering excessive flows. If the oxygen withdrawn is greatly in excess of the design maximum flow, the seat may chatter with sufficient violence to cause a local temperature rise that will ignite any combustible contaminant present.

Consistent attention to the principle of opening gas valves slowly has helped to protect industry personnel by almost eliminating oxygen fires. A fire does not occur every time a valve is opened suddenly because the apparatus is designed to take abuse. However, regulator seats get worn and may be contaminated with oil, soap, lint or other material of low flash point. It is then that the prac-

tice of opening valves slowly will prevent fires.

Oxyacetylene equipment is designed so that the gases are kept separate until just before they are to be burned, when they are brought together and intimately mixed in a mixing chamber close to the tip. Flames will not propagate in the oxygen line nor in the acetylene line so long as the gases are kept separate. Consequently, flashbacks due to temporary obstructions of the oxyacetylene flame will normally stop at the mixing chamber of the torch.

Purge before Lighting

This safe condition prevails no longer if air or oxygen is permitted to get into the acetylene line or acetylene to get into the oxygen line. Then a flashback may progress back through the mixer to cause a fire in the hose or regulator. Under unusual conditions, a flashback of this nature can rupture the hose.

The remedy is to purge oxygen and acetylene lines before lighting the torch. The lines are purged individually, oxygen being used to purge the oxygen line and acetylene to purge the acetylene line. When this practice is followed, flashbacks are confined to the torch tip and can only cause backfires on starting up.

A theoretically ideal purge is obtained by opening each valve for as many seconds as are deemed necessary to move gas through the length of hose at the gas velocity established by the tip size and pressure employed. To be more specific, gas velocity in a ¼-in. hose feeding a welding tip with an orifice of 30 drill size (0.1285 in.) at a pressure of 10 psi is 5.6 ft per second. Consequently, the hose would be completely purged if the gas valve is opened one second for every 5.6 ft of hose. Actually, this will usually be longer than necessary since air diffusing into the hose from the torch takes considerable time to diffuse along the entire length of hose. A compromise that keeps purging a simple precaution is to purge for one second for each 5 ft of welding or preheat cutting hose. This should be modified for hose lines in excess of 50 ft to avoid long purging times.

In order to keep purging procedures reasonably brief, it is important to avoid odd combinations of large hose and small tips. A tip of 62 drill size (0.038-in orifice) at 1 psi in a ¼-in. hose gives a linear flow of 0.013 ft per second. Purging at the rate of 77 seconds per foot of hose is obviously impractical. If such a combination is necessary, the original line purge should be accomplished with the tip removed. Whenever two-hose cutting torches are in use, the cutting oxygen valve provides the quicker oxygen purge.

The need for purging is particularly important with heavy-duty multiple-cutting operations. Passages carrying mixed gases are of greater capacity, and a flashback is more likely to push hot combustion products back into the hose lines feeding the torch where a hose fire can occur. With three-hose cutting torches, the cutting oxygen should be purged after the preheat gases in order to blow out any combustible gas that may have flowed back through the exit orifice of the cutting tip. This back flow of gas can be either pure acetylene or a mixture of carbon monoxide and hydrogen (the primary products of the combustion of an oxyacetylene mixture). The oxygen passage must be cleared of these gases before the cutting torch is lighted.

Newly assembled hoses should be purged before attachment to the torch. A common cause of the flashback that travels back further than the mixing chamber is the assembling of separate acetylene hose and regulators that are full of air. Also, torch valves left open overnight or over a week end will let air diffuse into the acetylene line and mix with the acetylene present.

Many weldors make the mistake of laying the torch in a work box on the back of the cylinder cart without closing the cylinder valves. If the torch valves are open and the tip happens to rest against a glove or cloth, a regulator that has not been shut off completely will force one gas back through the mixer into the other line.

For most reliable operation, do not permit unauthorized people to handle the equipment. Assume that there are mixed gases in the hose lines when starting up; then purge before lighting whenever a torch has been laid aside for any length of time, particularly overnight. Use manufacturers' recommended pressures and keep valves and tips in good condition. Purge long enough to clear the lines of mixed gases, and purge cutting-oxygen passages last.

Heat, flames and sparks must be kept away from combustible materials. This last caution is the most important, probably the best understood and oftentimes the most abused. Both the employee and management should be educated to their responsibilities.

Safety Is Everybody's Job

Where routine cutting and welding can be done in one spot, the operation can be set up with full protection to nearby combustibles. The major problem arises from maintenance and construction operations where the site is not fixed and where more than the usual precautions are necessary.

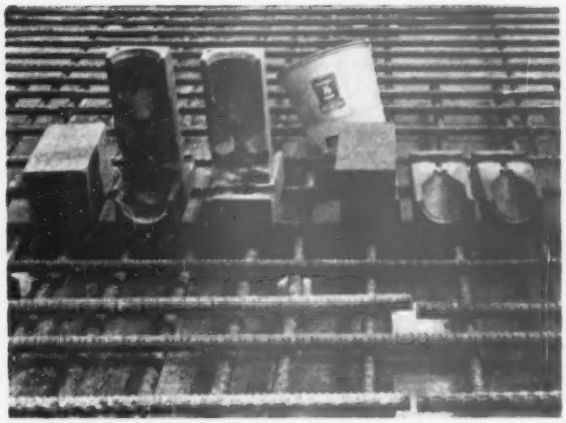
It is accepted practice to require permits for oxyacetylene operations of a specific nature and to require that they be approved by qualified personnel after making sure that all combustibles in the vicinity are protected and that the operation itself is safe. Since management cannot always supply the ultimate in fire-protective design and equipment, oxyacetylene operators and foremen in charge of these operations must possess a knowledge of the combustibility of materials and the suitability of fire extinguishers.

Maintenance and construction personnel handling the oxyacetylene processes should understand the combustion characteristics of high flash liquids, of quenching oils, of paints, lacquers and building materials. They should be able to spot unsafe conditions due to spillage, leaks and the quantity or distribution of combustibles. They should be equally familiar with the location and the ability of fire extinguishers.

Sparks Fly Far

Sparks from welding and cutting operations may travel 50 ft at times or drop through cracks in flooring. The most effective and practical control is to keep oxyacetylene operations at a safe distance from all combustibles. If adequate separation is not possible, then protection should be provided in the form of screens and mats or tarpaulins. When the risks involve property, equipment or production facilities of appreciable value, the need for a fire watcher provided with adequate fire-fighting equipment should also be considered.

The five basic safe practices presented in this paper represent stable foundations upon which the full rules of safe practices can be built. But an accident-free record requires more than a code of safe practices.

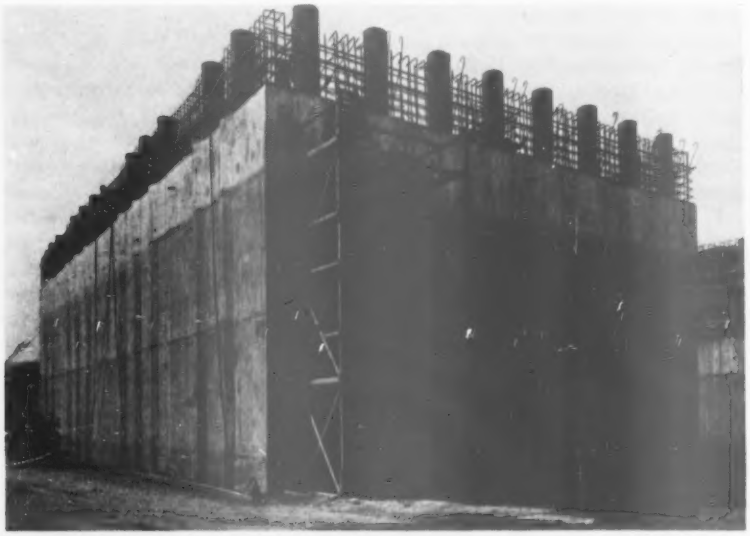


1—MOLDS and other equipment for new thermit welding

2—BARS aligned, mold halves are placed over joint

Waxless Thermit Welding

5—HOLLOW blocks shown above were made to carry major portion of the dead weight of the Tappan Zee Bridge. These concrete boxes float submerged



6—WALLS and bases of these enormous concrete caissons required a continuous framework of reinforcing bars. The bars had to be welded together

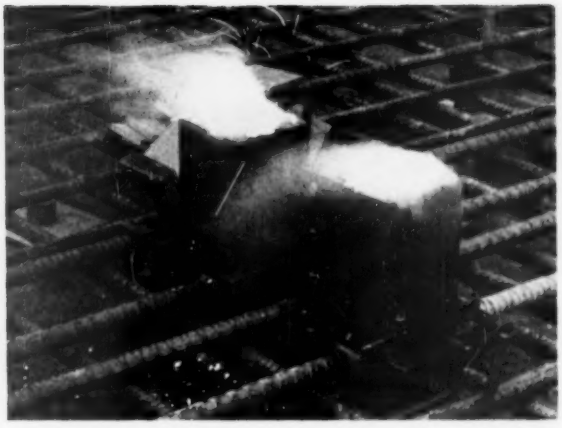
THE $60,000,000 Tappan Zee Bridge, which carries the New York State Thruway across the Hudson River between Tarrytown and South Nyack, N. Y., is partially supported by eight submerged, watertight boxes of precast concrete. Buoyancy of these boxes is sufficient to support 80% of the dead load of the bridge. The other 20% of the dead load and all of the live load are carried by piles driven into the river bed.

These hollow boxes (photos 5 and 6) are gigantic rectangular blocks, which vary in size from 100 by 190 ft by 35 ft high down to 56 by 110 ft by 32 ft 10 in. high. They were partially constructed at Haverstraw, N. Y., about 10 miles north of the bridge, and floated down the river to be completed to their final height at the bridge site. The job of building the boxes was handled by Corbetta Construction Co., Inc.

Walls and bases of these enormous concrete caissons required a continuous framework of reinforcing bars (photo 8). In the largest box, these bars had to be 100 ft and 190 ft long. The problem was to provide continuous bars in lengths up to 190 ft when the longest stock bars that could be ordered were only 67 ft 6 in. The only solution was to butt weld shorter bars together.

The heavy reinforcement for the base slab of each box consists of several layers of 1¼-in. round bars and 2-in. square bars. Arc welding would have been very slow on butt joints of

3—SACK holds just enough thermit to make one weld



4—REACTION takes only 30 seconds to reach 5,000 F

Needs No Preheat

these dimensions. Hence the decision was reached to make each of these joints by thermit welding.

With the exception of the starting thermit, all of the materials and supplies for making one weld on a given size of reinforcing bar were packed and shipped as a unit. Each unit contained a pair of molds, a bag holding just sufficient thermit to make one weld, luting sand, a small metal disc and a specific quantity of punchings.

The upper part of the mold was shaped like a funnel (photo 1). The steel disc, placed at the bottom of the funnel, served to keep the molten thermit from flowing prematurely into the gap between the bar ends. Since the mold contained no wax, it was not necessary to preheat to melt the wax, as in ordinary thermit welding.

The ends of the two bars to be welded were cut off square with an oxyacetylene torch and lined up so they were spaced about ½ in. apart, as in photo 2. Then the two halves of the baked refractory mold were placed around the joint and clamped together. A small quantity of the refractory sand, also provided with the outfit, was packed around the junction of the bars and the mold to keep the molten metal from running out. Then the metal disc and the steel punchings were placed in the mold. Finally, the bag of thermit compound (a mixture of iron oxide and aluminum) was emptied into the mold (photo 3). For the 1¼-in. bars, 5 lb of thermit was used; for the 2-in. bars, 8 lb.

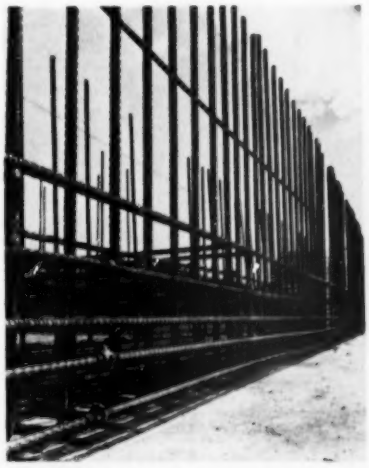
Starting thermit, a teaspoonful to each weld, was put on top of the regular thermit and ignited with a spark lighter or a welding torch. This started the thermit reaction (photo 4). This chemical reaction takes only 30 seconds to complete and develops a temperature of 5,000 F. Products of the reaction are an alumina slag and a superheated steel. The slag, being light, floated to the top, but the fluid steel dropped to the bottom of the upper part of the mold. It burned through the metal disc and then ran into the lower mold to fuse the bar ends together.

The mold was removed in a few minutes and discarded. This left the weld with gates and riser exposed. These were easily knocked off with a machinist's hammer or cut off with a torch, leaving the welded joint as in photo 7. Approximately 1,000 such welds were made on the 1¼ and 2-in. bars.

The lighter reinforcing bars for the walls of the box were tied together into mats by arc welding. Assembly was speeded by a steel-angle jig, which had notches for positioning the bars quickly. After the bars had been arranged in the jig, weldors made simple tack welds at about one out of every five intersections. These tacks were adequate to hold the mat rigid until it could be set in place.

Photos courtesy Metal and Thermit Corp.

7—COMPLETED thermit weld with gates and risers off. Weld is left in this unfinished condition



8—REINFORCING bars provide a framework or skeleton for concrete

1—AUTOMATIC welder for the condenser makes 2,600 separate welds in 15 seconds

2—ARMS of this machine come up and over to form evaporator (food freezer). Welder then comes down and welds the two sides together

Refrigerator Plant

Hotpoint's advanced refrigeration plant embodies new ideas, layout, techniques, skills and many new production tools, including specially designed welders.

PARTS for the "refrigerator of tomorrow." Man is holding an evaporator; leaning below it is a condenser or heat dissipator, while at the bottom is the compressor

BY CLYDE B. CLASON

BUILT to build the "refrigerator of tomorrow," the Hotpoint Company's new plant at Cicero, Ill., is now operating at full capacity on the 1954 household refrigerator line. The plant occupies 1,000,000 sq ft of floor space and employs about 1,500 workers. The most advanced welding techniques and equipment are used.

The main-assembly conveyor line in the refrigerator unit plant is 7,000 ft long and carries all component parts. This line goes directly through the various departments that make parts, avoiding the bringing of component parts to the production line. This innovation is expected to greatly minimize trucking and other part handling.

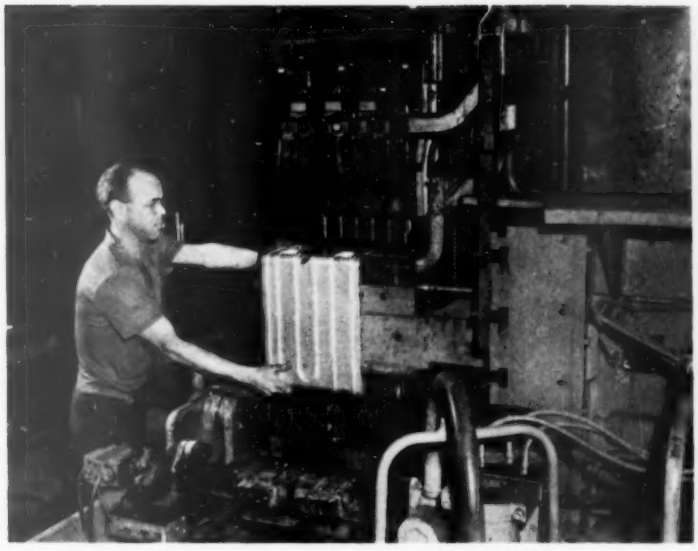
The plant has another desirable feature. Production supervisors and production control departments do not have to contact any other department in meeting main assembly-line schedules. Each department is separate from the other, and each is responsible for its own component part. Raw material storage and re-handling problems are greatly reduced by allowing additional space in the department for storage of raw materials as they are received.

The cooling unit plant is laid out so that raw materials, steel, copper, aluminum, etc., are stored in a storage area 40 ft wide by 400 ft long on the extreme west side of the plant. The flow of materials into the production lines is from west to east.

Fabricating Condensers

The plant employs a new method of fabricating condensers, the part that dissipates heat in the refrigerator. This method eliminates the use of a large number of wire reels in the fabricating area and permits a close tie-in with the main unit assembly line. Condenser units are produced at the rate of 150 per hour.

Two women operators sit above one side of an automatic sliding rack



3—WELDED evaporator is removed from the special tangent bender (see also photo 2). The whole automatic operation takes 15 seconds

4—LIKE putting a cake in an oven is the new automatic Tig welding technique

# of Tomorrow

and feed previously cut wire into a magazine. A rectangular form passes underneath the magazine to pick up the wires. A spring-loaded lock prevents more than one wire from entering a comb in the form. When the bottom side of the form has been filled, an operator places the formed tubing on top of the wires. The form then passes to a second loading operator, who adds the top layer of wire. This process takes three or four seconds.

The complete form is fed directly into a press-type automatic welder (photo 1). The first of its kind to be used in the refrigeration industry, this multiple welder makes 2,600 separate welds. When the welding has been completed—it takes only 13 to 15 seconds—the condenser is removed to a conveyor and carried to a machine that forms the tube ends. It is tested for leaks and is then moved to the unit assembly line.

Making an Evaporator

A machine specially designed to simplify the making of the refrigerator evaporator (food freezer) combines straightening, shearing and stacking of aluminum sheets. Rolls of aluminum are fed directly into the straightener, from there into a standard shearing press, and are then automatically stacked.

The cutout sheet aluminum is sent to the evaporator wrap presses. Three 150-ton press brakes pierce, emboss and flange the flat sheets. The evaporator components are sent to an automatic washing machine. Every trace of dirt is removed, as is necessary for good brazing. The aluminum evaporator tubing is set on the back of the evaporator sheet, and brazing strips are inserted between the tubing and the sheet. The assembly goes into a brazing furnace, which bonds the tubing to the flanged sheets. The evaporator then moves to an acid pickle and water rinse, is air dried and inspected.

Forming of the evaporator and assembly of the evaporator back into its proper shape is a new operation in the refrigerator industry. Hotpoint uses only one machine for the complete operation. This is a combination tangent bender and multiple spot welder (photos 2 and 3).

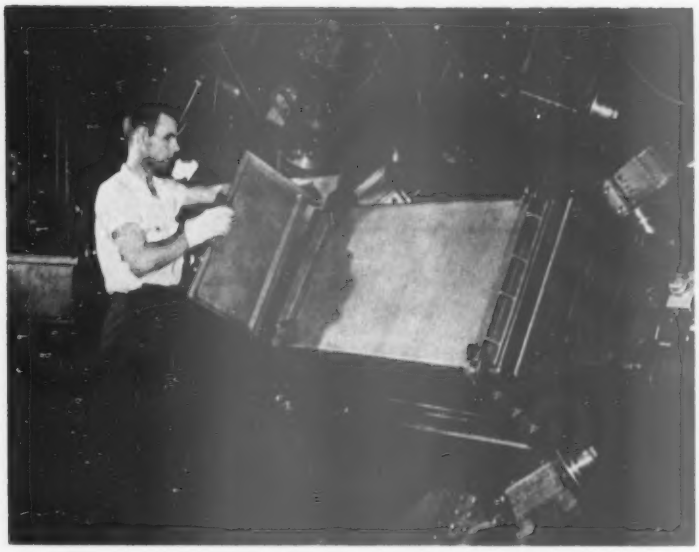
The welder is laid horizontally across the tangent bender. The evaporator back is placed in the machine with the tube and sheet assembly. Two heads move upward to bring the evaporator sides around and curl them across the ends. The welding electrodes move down and weld the ends together. The result is an evaporator with a back assembled. Total time is 15 seconds.

Final sizing of the evaporator and crimping of the back is done simultaneously on an expanding and crimping machine, also specially designed for Hotpoint.

Inert-Gas Welding, Too

An argon-shielded arc-welding process (photo 4) welds the header assembly to the evaporator and the copper-aluminum connector to the evaporator. A tungsten electrode is employed without filler metal. No manual welding is used; the entire process is completely automatic. The operator puts the assembly into the welder, just like putting a cake in the oven. She pushes a button and watches instruments. The "cake" comes out perfectly done.

High-pressure air combined with freon is injected into the completed evaporator. This pressure remains in the evaporator until it is ready for assembly on the refrigerator. The freon is injected with high-pressure air to permit the use of a sensitive leak-



5—FINAL welding of food liner is done in a single operation. In this picture, the operator is slipping an end piece into its place

6—ALL seams are welded simultaneously by the "octopus" (as welder is known)

testing detector as the last operation.

The evaporator is next given an anodizing treatment to prevent oxidation. An automatic anodizing machine is used. The anodizing process is in actuality a de-plating process, in which metal is thrown off instead of being put on. After anodizing, the whole of the evaporator is inspected for anodizing thickness. A leak detector sensitive to freon is used to detect any minute leaks that might occur in the tubing or welded joints. The inspection is done in a pressurized room to make certain that no contaminated air influences the leak detector.

The conveyor line for main assembly starts in the evaporator department, where it picks up the evaporator. It moves to the condenser and mounting-frame assembly department, picking up these assemblies. Welding of the cooling unit frame is done quickly on projection welders (photo 8).

Moving on to the tube-fabricating department, the conveyor line picks up the heat exchanger and other tubing. It proceeds to the silver-soldering operation, where the refrigerator unit is charged with an inert gas. Before the last joint has been silver soldered, dry air is forced through the entire system at a controlled pressure. The air flow is measured to determine whether or not the unit is functioning properly.

After the last joint has been brazed, the cooling unit is charged with high-pressure dry air and is sent through a washing operation, which removes any dirt or materials from the welded joints.

To test for any leaks that may be present, the unit is submerged for 1½ minutes in a high-pressure tank. As it passes through the tank, the operators watch for tiny air bubbles and report leaking units to a station about 25 ft farther down the line.

Dehydrating Process

Emerging from the test tank, each cooling unit goes to an automatic blow-off, which dries it. It then moves to what is probably the most critical process in the plant, dehydration. This process removes all the moisture that is present in the cooling unit.

The cooling unit remains on the conveyor line as it goes through the dehydration process. Four units are attached to a vacuum cart, which travels underneath the dehydration oven on a conveyor line. Eighty-two vacuum carts are needed in the dehydration system.

Helium Leak Detection

After the dehydration operation, the cooling unit continues on a conveyor line into a hood, where there is a low concentration of helium. If there is any leak, helium gas is sucked into the unit because of the high vacuum left from the vacuum carts in dehydration. Even small traces of helium in the cooling unit, indicating a minute leak, are detected by a sensitive electronic device. This instrument, a mass-spectrometer, will detect leaks so small that it would take 200 years for one ounce of refrigerant to leak out. Two mass-spectrometers are in operation on the production line, and one is kept as a spare.

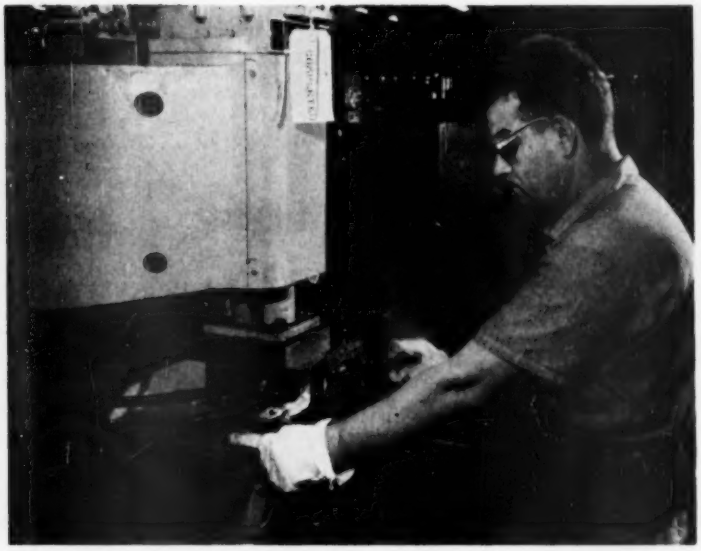
At the next station, an automatic charging board injects the correct amount of oil and freon into the compressor. This entirely automatic operation eliminates any possible human error.

The unit moves to an automatic dip tank, is painted, moves upstairs for wire harness attachments and subassembly parts and then goes to the test room. Here it is subjected to tests, which last about two hours, to determine whether or not it will cool properly and to check its frost ability and its frost lines. Another test is given in a sound-and-vibration room to make sure that the unit is running smoothly, without noise, jarring or slapping. After these tests, the unit moves on the conveyor to the make-up area and then downstairs to the final refrigerator assembly line.

Refrigerator Cabinets

Fabrication of refrigerators, doors and cabinets is done in a converted storage area of the company's range plant. Raw steel is brought to the plant by rail or truck and unloaded

7—LAST step is removal of completed food liner from giant resistance welder



8—ANOTHER welding job at the Hotpoint refrigerator plant. Frame for the cooling unit is welded quickly on above projection welder

by a 15-ton overhead conveyor crane.

The plant is laid out with north to south fabrication lines: one for food liners, one for doors, one for cabinets and one for miscellaneous small parts. This allows Hotpoint to make each major part of the refrigerator in an in-line progressive manner.

Most of the raw steel is run through a leveler and then cut into the required sizes. Door steel goes into three giant 400-ton fabrication presses, then proceeds to special flanging, piercing and welding machines. Cabinet steel is fed into a notching press, then through a rolling machine, through tangent benders and to a multiple-spot welder for welding in the refrigerator backs.

Liner steel is fed into a 400-ton press for blanking, piercing and embossing. It then proceeds through special flanging and "U" forming equipment, after which it goes through an automatic washing machine. The next step is assembly by seam welding (photos 5, 6 and 7).

Seam-Welding Octopus

In photo 5, the operator is slipping an end piece of the food liner into place, prior to welding. The special six-wheel seam welding machine is known to company employees as "the octopus" from its general appearance. The welding arms move into position to weld all sides of the liner in one operation (photo 6). A touch of the button and a few seconds later the completed liner is removed (photo 7). This machine represents another Hotpoint "first" in the refrigeration industry.

Food liners are sent to the porcelain finishing department at the extreme north end of the building. They are spray pickled and move by conveyor into the vitreous enamel department. Liners are dipped in the ground coat and pass through a tunnel to be dried by infrared lamps. Other coats of enamel are added and fired by electric furnace before the liner leaves the vitreous enamel department.

Doors and Cabinets

Refrigerator doors and cabinets are passed through a six-stage washing process consisting of an alkali wash, hot water rinse, cold water rinse, phosphatizing, cold water rinse, chromic acid rinse and then into a drying oven. A flow-coat machine automatically applies a resin primer coat. A vapor chamber allows the doors and cabinets to drain properly.

The parts are sent into an infrared bake oven. Next comes the spray booth for reinforcing the primer coat. Other production operations follow as the doors, cabinets and cooling units move toward the final assembly line.

After the refrigerator has been finally assembled, the cooling unit passes through another leak test and another noise test. To test the sealing of the door and the cabinet in general, Hotpoint uses a very rigid test in which pressure is inserted inside the cabinet. A gage indicates the tightness of the seal.

As the unit reaches the end of the assembly line and flows into the crating line, the refrigerator picks up the bottom cardboard packing from an automatic feeder underneath the roller line. This eliminates an additional packing operation. As it moves on, additional packing and crating materials are added. Finally, it merges with the electric range line in the warehouse area.

One feature of the new refrigerator plant that is not found in other plants is its reversible storage conveyor unit, which will be used as a protection bank to insure production on the assembly line.

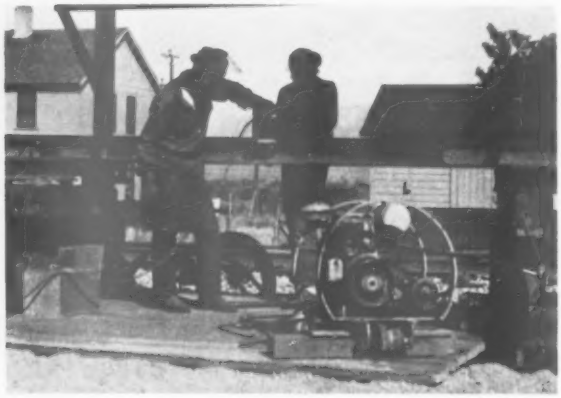
To summarize, the new Hotpoint refrigerator plant is the most advanced in the appliance industry. It will produce one refrigerator every 40 seconds. In one year, the plant will eat up 60,000,000 lb of steel, 2,000,000 lb of aluminum and 428,000 lb of copper and stainless steel.

Over 98% of the equipment in the plant is new, and most of it was specially designed for Hotpoint's highly engineered operations. Each refrigerator is tested 14 times before final crating and shipping. The conveyor lines, if combined, would stretch for 9.8 miles.

1—RAIL welding shop of Northern Pacific Railway at Big Timber, Mont. Rails to be welded in background

2—ABUTTING ends of two 39-ft lengths of rail are squared up prior to welding on this power-driven saw

5—OXYACETYLENE flames normalize the welded joint by reheating it to a temperature of 1,500 to 1,550 F



6—JOINT gets a magnetic-particle inspection after it has been ground smooth by the rail grinder at right

Half-Mile Welded

Problem: to weld four miles of railroad rail and transport eight half-mile lengths 850 miles to the installation site. Here is a step by step account.

BY T. B. JEFFERSON

WHEN the Northern Pacific Railway started using continuous welded rails, the management set up a rail-welding shop at Big Timber, Mont., to place the program on a production-line basis. As a result of completing a 12-mile stretch of continuous rail on the Transcontinental line east of Livingston, Mont., the railroad now has in operation in this area more than forty miles of continuous welded rail.

Just because the rail-welding shop is at Big Timber, however, does not necessarily mean that it confines its operation to the welding of rail for the immediate vicinity. For instance, it recently turned out four miles of rail for the Stampede tunnel, which is 850 miles away from the welding shop.

This tunnel is on the main line of the Northern Pacific in the Cascade Mountains northeast of Seattle. The 140-lb-per-yard rail, the heaviest ever to be laid on the Northern Pacific, had to be welded at Big Timber and shipped 850 miles. The rail was welded into one-half mile lengths, eight of which were transported in a train composed of 55 open-end ballast cars. Surely this was one of the most unusual freight deliveries ever made in the history of American railroads!

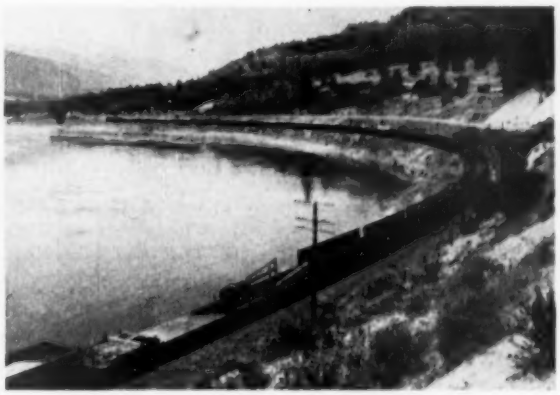
Bent around Curves

Our front cover shows the eight half-mile sections successfully negotiating an S-curve along the Clark Fork river in Montana. One of the most amazing features of this hauling job was the way in which the rails bent to follow the curves (maximum curvature was 11 degrees) and straightened out again on the straight stretches. To be able to do this, the rails had to be anchored firmly to prevent lateral movement.

3—ACTUAL weld is accomplished in five minutes at a temperature of 2,300 F and pressure of 2,500 psi

4—AFTER welding, air-operated shears trim excess metal or flash from the top and sides of the rail head

7—WINCH pulls the welded rail through stations pictured and finally onto the open-end ballast cars



8—RIDING an 11-degree curve. Note falsework at end of rails and car of gravel to provide protection

Rails Ride 850 Miles

The entire rail-welding operation was carried on in more or less open sheds alongside the railroad's right-of-way at Big Timber. Oxyacetylene pressure welding was employed, necessitating the purchase of huge quantities of oxygen and acetylene. The supply of charged cylinders and the manifold arrangements may be seen in photo 1. The empty cylinders are lying on the ground, while the rail to be welded is on skids in the background.

Before a rail can be welded, it is necessary to make sure that there will not be any loose mill scale, rust particles or other impurities to contaminate the welded joint. First step, therefore, was to flame-clean the ends of the rail for a distance of about a foot back. The flame-cleaning operation took place before the 39-ft rail length had been skidded from the storage rack onto the rollers that carry it through the production line. After flame-cleaning, the rail was moved to a power saw (photo 2), where abutting ends of rail sections were squared up by sawing. With the ends clean, smooth and square, the rails were carried toward the welding station.

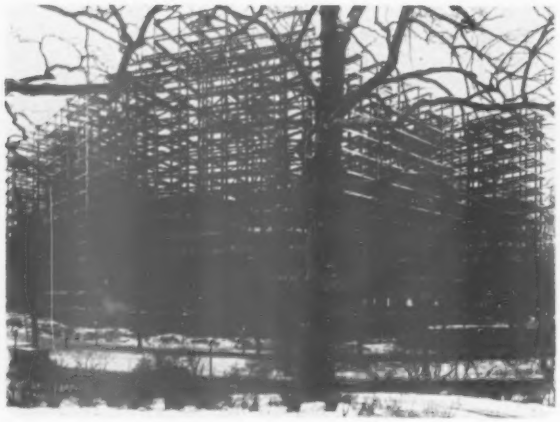
How Welds Were Made

As a necessary preliminary to welding, the rail ends were washed off with ethylene dichloride (to remove any grease they may have picked up since flame-cleaning) and polished. Then the ends of abutting rails were clamped together in the welding machine (photo 3) under a pressure between 2,500 and 2,700 psi.

The actual welding at the Big Timber shop is accomplished by means of oxyacetylene flames from 125 tips. These heat the end of the rail to a temperature of 2,300 F. After about five minutes of such heating under such extreme pressure, the weld is made.

The welded rail was hooked to a winch cable, which pulled it ahead to the next station. The excess metal was trimmed from the tops and sides of the rail head by means of air-operated shears (photo 4). While this operation was taking place, two more rail ends were being joined in the pressure welder. From this point on, every operation in the production

(Continued on page 46)



ARCHITECT'S drawing of front of building. Compare with photo of steel framework, taken from same position

Big Job for Welded Steel

The use of welded connections and continuity design saved 135 tons of steel in the construction of the new 14-story Broadview Apartments. It also saved time.

BY VAN RENSSELAER P. SAXE

ONE of the reasons for selecting a welded structural steel design for Baltimore's new Broadview Apartments was the saving it effected. By using welded fixed-end connections of beams to their columns, over 85 tons of connection steel were saved, as compared to the riveted connections that would have been required to do the same work. Considerable additional tonnage was saved because of the type of butt-welded column splice used to transmit bending in the columns.

This 14-story building contains 465 apartments plus garage space in the basement for 200 cars. It covers an area of 620,000 sq ft at the junction of 39th St. and University Parkway, Baltimore, Md. Monthly rentals range from $64 for a one-room "efficiency" apartment up to $300 for a penthouse.

Study Various Constructions

At the start of this project, studies were made of various types of structural frames. Taken into consideration were the architectural requirements, building code, time involved in construction and relative costs of the various types of construction. Results of the comparative studies indicated that the combination best answering all of the requirements would be a welded structural-steel frame, using a bar-joist floor system, perlite plaster ceiling and perlite plaster fireproofing.

Wind bracing was required under the building code because of the narrow width of the building in proportion to its height. As compared to a reinforced-concrete design, the welded steel frame with the bar-joist type of floor was found to allow wind-brace girders of smaller depth, smaller columns, smaller foundations. It would also enable more rapid construction, with all cost differences favoring the steel frame. The shorter construction period not only saved interest on the investment but made it possible to have the building done in time for the rental season. Aside from these elements of time and cost, there were other advantages in the type of construction selected.

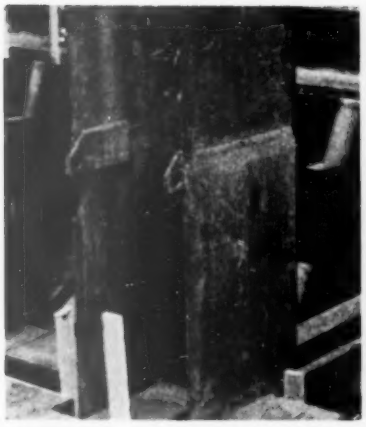
One of these advantages is that welding makes practically no noise as compared to riveting. This was important because of the nearness of other apartment houses. Also it would not have been possible in this area to secure enough riveting gangs to erect the building with the same speed that was developed from the use of the simple welded connections. Shortage of labor was no problem with welding as there were plenty of good weldors available.

Sold on Welding

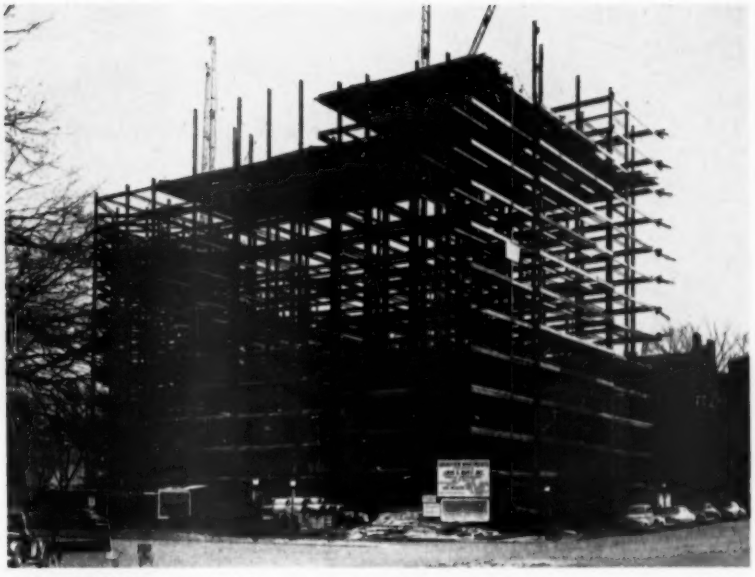
An interesting consequence to be noted here is that the building's owner, John K. Ruff, has been thoroughly sold on welded construction as a result of this job. Since Mr. Ruff is one of Baltimore's leading contractors, the fact is not without significance.

The wind-bracing requirement had definite influence on the final structural design. In this type of structural frame with a bar-joist floor system, it is necesary that the steel itself take all the stresses. Dependence cannot be placed on stiffness developed by bar joists beyond the fact that the wind-bracing beams to which the joists are welded are stiffened laterally from side deflection.

Of necessity, the wind-brace bents were placed crosswise of the building, and the beams forming the bents were designed to support the floor loads brought to them by the bar joists and the wind loads. This method of supporting the bar joists on interior crossbeams permitted shallow spandrel beams and made a safer working condition for the men placing the bar joists. These men were always working over a floor below instead of from a spandrel beam where they can be exposed to long



TYPICAL butt-weld column splice



CANTILEVER spandrel beams support all corners (arrows at extreme right)

falls should any mishap occur.

The exterior walls were made up of 4-in. bricks and 4-in. back-up slag blocks. These walls were supported on exterior spandrel channels, to which shelf angles were welded. The spandrel channels are attached to the inside face of the outside column flange. This means that the spandrel beam could be maintained at constant dimension throughout the height of the building because the same size of column was used from basement to roof. Though the column size remained the same, lighter-weight sections were used as load conditions lessened.

A little study between architect and structural-steel engineer will enable this method to be applied in any building. Though the item is of seemingly small importance, it results in large savings in detail drawings as well as in shop and field costs because of the great duplication of detail and material fabrication gained by this method of placing spandrel beams. Spandrel detail and attachment to exterior column are shown in Fig. 1.

Where riveted connections are used, brackets projecting below ceiling construction are often seen and required. The welded design eliminated all projecting brackets. It can be truthfully stated that in this building there is no connection covering showing in the finished rooms. Wherever possible, spandrel beams supporting exterior walls and beams running along central corridors in the lengthwise direction of the building were figured as continuous-moment beams. This saved about 35 tons of beams.

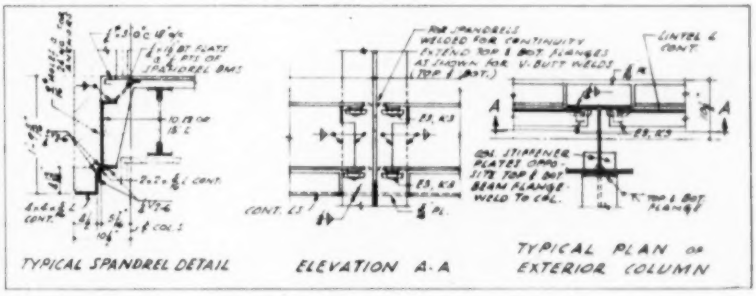


FIG. 1—Spandrel beam detail, including connection to exterior column

Corners Glassed-in

Columns were omitted at all corners of the building in order to allow the corners to be glassed-in in both directions. This architectural feature required that the corner of the floor, walls and glassed-in area be supported by beams cantilevered from the nearest wall column. To act as cantilever beams, the steel-channel spandrels for supporting these corners were welded to the nearest adjacent columns. The use of welded connections for these beams permitted the cantilever spandrels to be of the same appearance as all other spandrel beams. Hence an observer could detect no difference during construction in appearance of the spandrels beyond the fact that there were no columns in the corners.

The securing of corner windows in this manner added practically nothing to the cost of the building. The normal spandrel adjacent to the corner was merely continued as a cantilever to support the wall and floor.

A truly rigid frame has resulted from the use of welded connections. Furthermore, the earlier estimates of time and materials saved were found justified upon completion of the erected structure. For example, it was found that the use of the bar-joist type of floor construction with the welded steel frame has saved construction time of about three months. And the use of the welded connections and continuity design saved 135 tons of steel, as compared to a similar riveted structure.

Some 1,971 tons of structural steel and 800 tons of bar joists were used in the construction of the Broadview Apartments. Building owner and contractor is the John K. Ruff Co., Baltimore; architects were Palmer, Fisher, Williams and Nes, Baltimore; steel was furnished by Vulcan Rail and Construction Co., also of Baltimore.

1—TWO-STORY farm shop owned by Ray Creelman, Iowa farmer. Building is insulated and is heated in winter

2–CREELMAN spends most of his evenings in here, doing jobs for himself and sometimes for the neighbors

Welding on the Farm

The author toured the southeastern corner of Iowa to see what farm folks were doing with welding. Here are some of the things that he caught with his camera.

BY A. W. WETTACH

5—PORTABLE grinder has 50-ft extension cord for work outdoors

I DON'T like to go on record as being a braggart about my home state, but I honestly don't believe that you will find more fertile farming country than in Iowa. Nor more prosperous and up-to-date farms.

Naturally, Iowa farms are highly mechanized. A farmer has to be a first-rate mechanic to keep his equipment in running order. Many of them find welding indispensable for this purpose. And having purchased welding outfits, they use them to make things. It's a wonderful hobby for the long winter evenings.

Let's look first at the farm shop on the Ray Creelman place, near Oakville, in Des Moines county (photos 1 and 2). This is two-story, the upstairs being used for storage and for woodworking tools. Creelman spends much of his evening hours and off-season farming time here, doing repairs and construction for his own farm and sometimes for neighbors. His very complete shop includes both oxyacetylene and arc-welding equipment, motor-driven grinders and a lathe. The shop has a concrete floor in front, where large machinery can be repaired. It is insulated and is heated in the winter.

Creelman has been a farmer all his life. He learned how to operate his various shop tools, including welding equipment, by studying the instruction books and then putting the tools to work doing practical jobs.

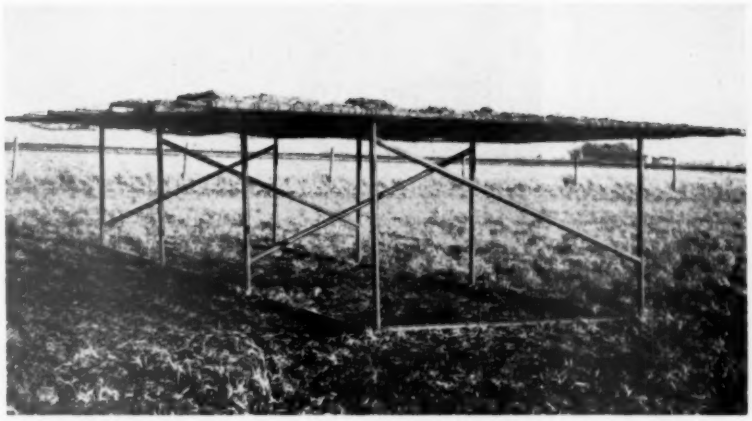
SUNSHADE FROM PIPE

At the Victor Lauer farm, near Mt. Union, Henry county, a welded sunshade for beef cattle has been set up in a meadow (photo 3). It shades an area of 16 by 24 ft and is movable to different locations as the cattle change their pasturage.

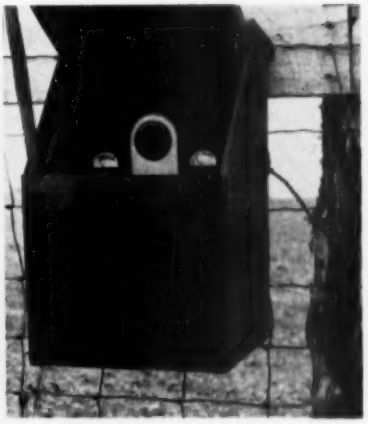
This cow's delight was built from old boiler flue pipe bought from a junk yard. The four pairs of upright posts are 6 ft high and are spaced 8 ft apart. The bottoms of the posts were welded to 24-ft longitudinal runners. An 8-ft cross pipe is inserted between the end posts at the base to act as a spacer. It has two pieces of strap iron welded on opposite sides at each end and can be dropped between the posts at either end. Clevises are attached to it for use when the structure is moved.

To provide a more rigid structure, the four pairs of pipe supports are braced with diagonal pipes. The diagonals are welded 20 in. from the ground on one post and 6 in. from the top on the opposite post. Directions of the diagonals alternate from one pair of posts to the next.

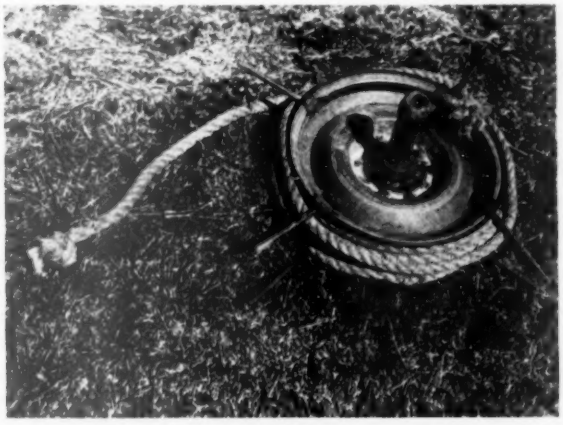
In order to reach the 16-ft spread of the overhanging roof and the 24-ft length of the runners, shorter pieces of pipe had to be welded together. When you are building a welded structure, however, this is not much



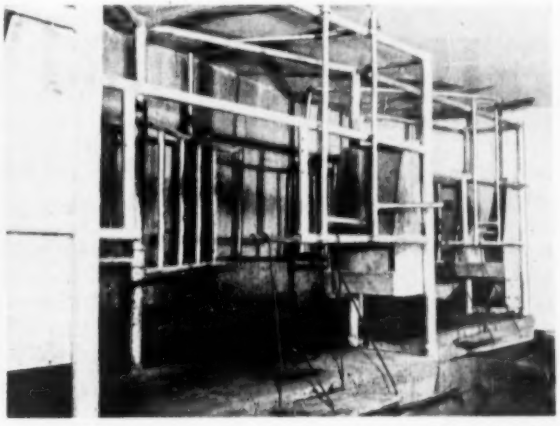
3—YOU'D never guess it, but this structure was built to shade cattle from the sun. The welded framework can be shifted from spot to spot



4—WELDED box houses battery and equipment for electric fence



6—OLD auto wheel was welded into a gadget. Quick unloading of chopped hay and silage is made possible



7—COWS come into this parlor to be milked. Rod-supported shelves hold the pails and milking units

extra trouble. The 16-ft cross pipes upholding the roofing material were welded to the underlying 24-ft longitudinal pipe rails at their points of intersection. The roof supports were covered with small-mesh poultry mesh and then with soybean straw. Woven wire is fastened over the straw to keep the cattle from eating up their shade.

At Pasture Farm, Albia, the battery and other equipment for an electrified fence is mounted inside a welded steel box (photo 4). This protects it from the weather and keeps cattle from rubbing against it.

A portable electric grinder (photo 5) is one of the handiest pieces of equipment to be found in the farm shop on Robert Foggy farm, near New London, Henry county. A 50-ft all-weather extension cord makes it possible to bring the grinder to farm machinery outdoors. Grinding is done in preparation for welding. The grinder can also be suspended by a ring on its case from a chain or fence stretcher and used to sharpen harrow discs.

Unloader from Auto Wheel

Melvin Hein, of Monticello, Jones county, has built a very clever device to speed the unloading of chopped hay and silage. Basically, it is nothing more than an old auto wheel (photo 6). Four pairs of iron rods were evenly spaced around the rim of the wheel and welded at right angles to it. These serve as guides for a hay rope, knotted through the enlarged valve stem opening in the rim. A hub made from old gears was welded in the center of the wheel, and a square shaft was welded to the hub.

This device works with a wagon unloader operated by an electric motor or gasoline engine. To unload, the rim is slipped over the end of the winch on the unloading wagon, and the rope wound around the wheel is tied to a tractor. When a trench silo is being filled, the wagon is pulled to distribute the chopped silage evenly. For faster unloading, both the wagon and the tractor move.

Old pipe bought at junk yards and a portable welding outfit made a three-stall milking parlor (photo 7) for the Austin Davis farm, near Moulton, Davis county. The milking units and pails are placed on shelves outside the stalls. Each of these wooden shelves is suspended by a welded frame of rods, hooked over the pipe. The air line for the milking machine is fastened to the side of the concrete platform.

The cows come into the parlor through a sliding door at the left of the three stalls. They leave by a similar door at the far end.

A This fixture can be revolved to allow weldor to get in hard-to-reach places. Note plier-type clamps

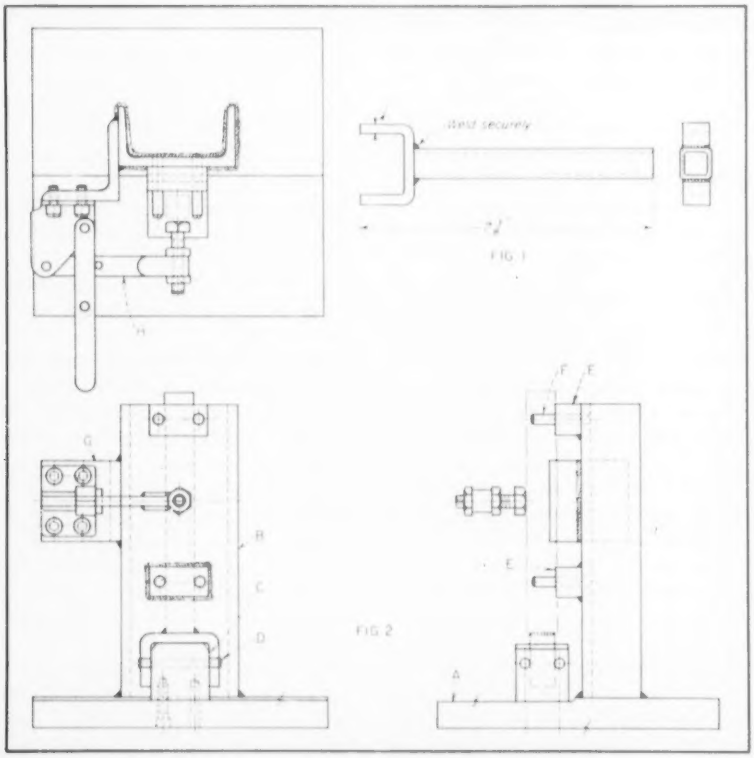
Photos courtesy Lapeer Mfg. Co.

B Toggle clamps permanently attached to fixture are used to hold tubular framework of a bus seat back

How to Build a Fixture

This article tells you: (1) how to provide access to the work; (2) what clamps to select; (3) how to locate the work and (4) how to prevent spatter.

BY ROGER ISETTS



Too much emphasis cannot be placed on the proper design of the fixtures for producing welded parts. There is a tendency to belittle the importance of fixture design on the grounds that it is not high-precision work. Nothing could be further from the truth. As much thought and care should go into the design of a welding fixture as goes into a drill jig, milling fixture or any other type of work-holding device. Choice of the

Here's One Example

FIGURE 1 shows a drive-sleeve assembly that is used extensively in the manufacture of farm implements. It is simply made by welding a ¼-in. steel clip onto the end of a piece of square tubing.

The fixture designed to hold this part while welding is shown in Fig. 2 in front, top and side views. It is simply constructed, easy to operate, and will turn out interchangeable pieces.

Base "A" is a flat piece of machine steel, to which is welded upright "B", a standard channel section. A brass locating block "C" is screwed and doweled in place on the top surface of "A". The two dowel pins "D" press into block "C" to locate the clip accurately.

The two pads "E" are welded onto channel "B" and finished off so that

proper locating points and clamping arrangements, and observance of the fundamental principles of design can go a long way in the direction of increased production and lowered costs. In addition, interchangeability of parts will be assured.

Since arc or gas welding is entirely dissimilar to machining, an entirely different set of rules must be followed in order to produce suitable fixtures. The basic principles involved in the design of a drill jig, for example, would be completely unsuited to design of a welding fixture. By observation, through trial and error and from previous experience, you can glean a great deal of information that can be advantageously applied to the design of a welding fixture. Each part presents its own specific problems, of course, but certain basic practices and principles hold true in most cases.

Before you proceed with the actual design of the fixture itself, you must take into consideration several important elements. One of these is the cost to be allowed to build the fixture. You would not be wise to make an expensive high-production fixture if the annual production is small and a high degree of accuracy is not required. On the other hand, the most costly fixture would probably be justified where production is large and the fixture cost can be easily amortized.

of Fixture Design:

they are both the same height. Four dowel pins "F" press into these pads to locate the tubing in a central position. The angle "G" is welded onto channel "B", and a standard toggle clamp "H" is bolted to it.

To load the fixture, the weldor places the clip over block "C" between dowels "D". He places the tubing between dowels "F" against pads "E" and clamps it into place by toggle clamp "H". Then he lays a bead on two sides of the tubing. To remove the completed piece, all that is necessary is to swing toggle "H" back out of the way and lift the work straight up until it clears dowels "D".

This fixture is foolproof and contains no complicated mechanisms to hamper the weldor. It is recommended as a practical example of the principles discussed in this article.

Leave Access to Work

One of the most important principles in the design of welding fixtures is to provide enough clearance around the work to allow the weldor to do his job. Any obstructions you place in his way will add considerably to the welding time—and hence up the cost of production. In cases where obstacles cannot be avoided, the difficulty of access can often be at least partially offset by trunnioning or tumbling the fixture; that is, by providing arrangements so the fixture can be revolved (photo A) or indexed when the weldor has to get at hard-to-reach places. Cutting out sections of the fixture can also help. This method is not recommended, however, if it will weaken the fixture so that it could fail in operation.

What Clamps to Select

It is desirable to have all clamps integral parts of the fixture. Loose pieces always have a tendency to get misplaced or lost. Clamping arrangements should be amply strong to prevent distortion of the work during welding. Clamps should also be as quick-acting as possible, other things being equal. Even more important, they should be simple. Complicated clamping arrangements will confuse the weldor and slow down the welding.

The screw handknob type of clamp is not practical because it takes too much time to screw down. A much better clamping device is the standard toggle clamp, a type that can be readily purchased from a number of concerns. These clamps are fast-acting and permit easy insertion and removal of the work. In addition, they are relatively inexpensive and can be quickly replaced when they are worn. Toggle clamps can very easily be permanently attached to a fixture (photo B).

Another type of clamp, very handy for some applications, is the preset clamp or clamping pliers, illustrated in photo A. These are said to permit a job to be set up in one-quarter the time required with standard C-clamps.

It is always best to avoid spring locators. The heat encountered during welding will take the temper out of them, and they will become coated with spatter, which renders them useless in a short time. If adjustment is necessary, it is much better to use a setscrew arrangement. The setscrew can be adjusted as desired, taking up any discrepancies in the workpieces.

Foolproof Locating

In designing any fixture, it is a good idea to make it entirely foolproof. If there is the slightest chance the work can be inserted in the wrong way, do something about it. Make it simply impossible for the work to be inserted upside down, or your fixture will result in a high loading time and offer many chances of producing rejections.

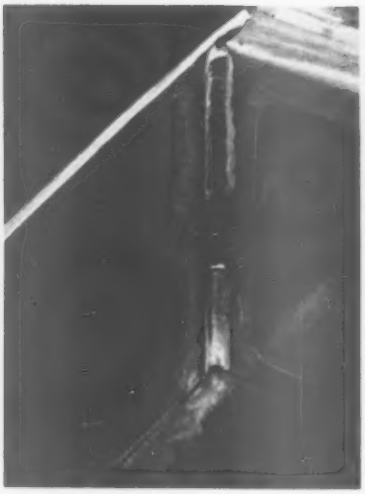
Locating points should also guarantee interchangeability of parts. The tolerances must be so close that one part comes out practically indistinguishable from another. If there are holes in the work, it is always good practice to use them for locating purposes. It is best to use at least two holes in the workpiece for locating. This will take up any slight variances in the center-to-center distances of the holes.

Non-ferrous metals have many uses as fixture components. If the fixture is all steel, the parts of it that are close to the welding area will heat up and become coated with welding spatter. It may be worth the extra cost of copper alloys for such parts because the spatter can be cleaned off more easily, and the heated area is less likely to expand and make it difficult to remove the work after it has been welded. Bronze of a grade that is not too brittle serves excellently for the parts subjected to heat. Furthermore, bronze has wearing qualities that closely approach those of steel.

There are various proprietary solutions that can be painted on the surfaces of the fixture parts to prevent spatter from sticking to them. This method is impractical, however, when the parts are subject to much heat or to wear. The solution will quickly come off, making it necessary for the weldor to reapply it at frequent intervals. That adds to the welding time.

The fixture should be made as light as possible without sacrifice of rigidity or accuracy. Standard structural steel shapes, such as I-beams, channels, angles, etc., should be utilized wherever possible. They are comparatively light in weight and when properly used can go a long way toward making a more effective fixture. They also help considerably in reducing the fixture cost.

1—RIBS are welded into a rudder



2—FILLET inside top edge blade

3—END is welded on top piece

Aluminum-Bronze Rudders

Mig Welding on

Where non-magnetic alloys must be fabricated at high production speed, metal inert-gas welding is proving itself to be a useful tool. Here are two examples.

BY JOHN GOWAN

Air Reduction Sales Co.

THE use of non-magnetic materials is essential on a wooden-hulled minesweeper to allow the ship to pass over and near submerged mines without detonating them. Aluminum, aluminum bronze, silicon bronze, stainless steel and Monel have all been used extensively for various parts and pieces of minesweeper equipment, including reels, water and fuel tanks, power plant mounts, gear blanks, sway brackets, rudder assemblies, sonar boxes, buoys, etc. These items have been fabricated for the Navy at an unprecedented rate by the many companies participating in the minesweeper program.

The metal inert-gas (Mig) welding process has made it possible to weld the various non-magnetic alloys at full production speed.

Aluminum-Bronze Rudders

As a practical example, let us first look at the fabrication of rudders for minesweepers. Here the material is ¼-in. and ½-in. aluminum-bronze plate. One way to weld aluminum bronze is to use carbon-arc welding with "coated stick" electrodes. High-quality deposits may be obtained this way. By the use of Mig welding for joining the major structural components to a cast rudder stock, however, the Backus Machine Co., Carlstadt, N. J., is obtaining truly impressive results.

The two rudder units that make a complete set involve a total of 1,110 in. of welding. The company is using two manual guns to make the 555 in. of welding needed by each rudder unit. Roughly, 32 lb of 1/16-in. filler wire are required to make the welds on a complete set. Each rudder unit is 6 ft 10 in. long and tapers from a top edge 61 in. wide to a bottom edge 43 in. wide.

A deposition speed of 220 ipm is only one of the factors contributing to production speed. Shielded by argon gas, the aluminum-bronze wire goes down smoothly, making a clean, dense deposit that requires little finishing. Actual welding speed averages 20 ipm. Welding conditions are: 325 amp, d-c, reverse polarity; argon flow of 50 cfh.

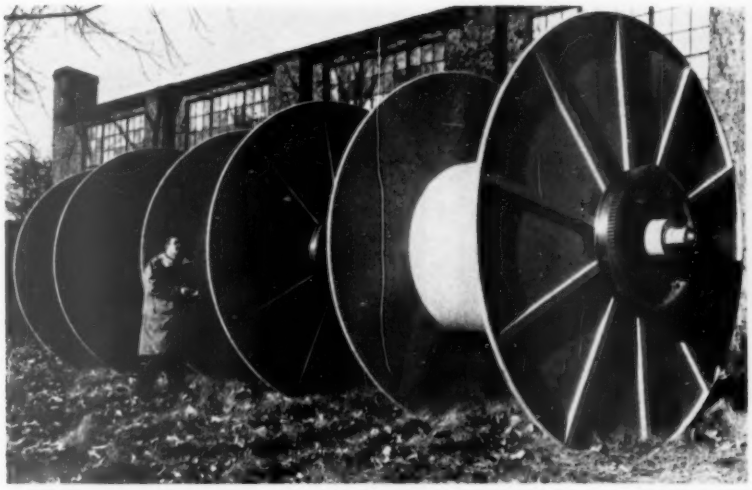
The easy manueverability of the manual gun and its ability to weld in the various positions required have enabled the fabricator to do away with repositioning of the workpiece for the many fillet and butt welds on this job.

They Work Together

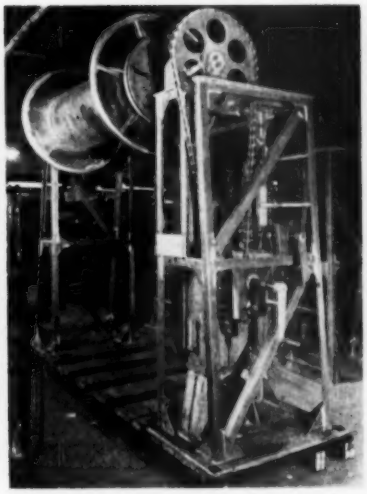
This application also demonstrates the way casting and welding can complement instead of compete with each other. Each rudder unit is made of a basic cast structure—the rudder stock. To this, the following structural elements are added: a canoe or bottom edge, a top edge blade, five ribs and a skin section covering the ribs.

Prior to welding the surfaces are cleaned to remove oxides. Backing plate for the skin is welded to each rib; a 25-in. fillet joins the rib to the backing strip. Then the series of five ribs are welded into the rudder unit (photo 1), with the backing strips at the bottom. Plugs on the backing strip are welded to the skin.

Close-up of a vertical fillet inside



4—LARGER spools are 11 ft 3 in. in diameter, with drums 5 ft 8 in. long



5—SMALL reel mounted in frame

Aluminum Cable Reels

Minesweepers

the top edge blade is shown in photo 2. This top blade is welded to the rudder stock. In photo 3, the operator is welding the end section on the top piece. This weldor is at the "pit" station, where vegetable pitch is poured into each rudder unit to deaden sound effects.

Use of the Mig welding process enables the Backus Machine Co. to easily meet its production schedule. As a final operation, all rudder units are ground to a smooth finish.

Aluminum Reels

An equally spectacular job is the fabrication of the giant aluminum spools shown in photo 4. These particular reels are made in two sizes by the Combined Equipment Co., Inc., Catskill, N. Y. Their purpose is to control and store the acoustic and magnetic minesweeping cables.

The size and scope of this welding project can be indicated by the fact that 2,000 lb of wrought aluminum plate and structural shapes are required for each "ship-set," and 50 lb of filler wire are needed for welding. The complete ship-set consists of a large reel, a small reel, an A-frame for the small reel, and drive and control equipment. Including electrical drives, etc., a complete set weighs 7,000 lb.

Photo 5 shows a ship-set (all but the large reel) assembled for test before shipment. The gears and chains are bronze. The housing for the gear box and gear drive is cast aluminum. The use of aluminum is highly desirable for products of this nature where lightness and non-magnetic properties are essential, but aluminum had not been a practicable material for large structural designs with heavy thicknesses until the advent of Mig welding.

Formerly, wood and steel were used in the composition of such reels. The wood-and-steel reels were heavy, cumbersome and subject to warping. In awarding the contract to Combined Equipment Co. for the design and manufacture of the non-magnetic reels and drives, the firm of Sparkman and Stephens, Inc., the Navy's design and procurement agent, specified aluminum construction.

First the Flanges

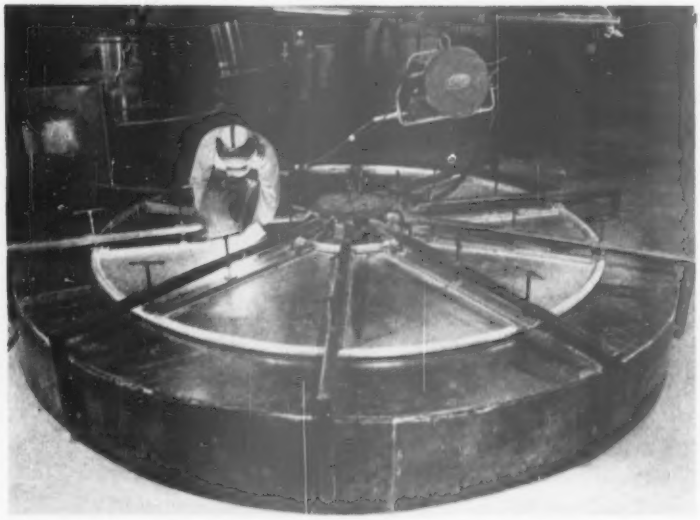
One of the flanges for the large reel is shown on its special jig in photo 6. This flange is made by welding together a large and small section of ¼-in. thick 61S-T6 aluminum plate in order to get a plate from which a circle 11 ft 3 in. in diameter can be cut. Before the two sections are welded, a central hole is cut in the large plate with a fly cutter. The hole is off-center, but will be in the center of the flange after the large plate has been welded to the smaller plate. This hole is used as a guide for a saw to cut the circumference of the flange.

A cast aluminum hub is put in the center hole of the flange plate. Pipe edge of the flange is formed in two halves and placed in position. Channel sections, precut to length, are placed like spokes around the flange between the hub and pipe edge. These can be seen in photo 6, which also shows the assembly jig. This jig holds the hub securely in place and also provides a means of holding down the circumferential pipe edge. Its base is poured concrete, covered with steel.

All welds are made with a manual welding gun, and all are ¼-in. fillets. The channels are not only welded to the plate but also to the pipe circumference. When one side has been welded, the flange is turned over, and the weld between the flange edge (pipe) and flange plate is finished.

Then the Drums

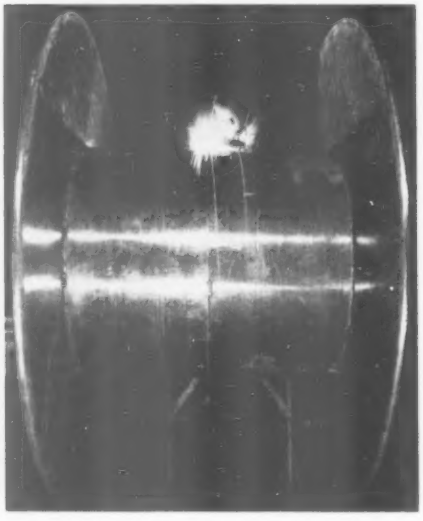
The plate for one-quarter of the drum is purchased to size and rolled to form a half of the drum half. The curved plates are positioned against a flange to form a cylinder that is



6—WELDING one of the flanges. Plate is ¼-in.; piping on rim 1½ in.

7—INSIDE of drum welded to flange

8—OUTSIDE fillet weld is being made to join drum half to flange



9—FINAL welds are now made on drum

held in place by gussets that are tacked to the flange. A roller angle is welded inside the drum against the flange as an additional strength member. Fillets are made both inside (photo 7) and outside (photo 8) to join the half drum and the flange.

A backing strip for the longitudinal seam, to be welded later, is provided on the inside of the drum half. This is shown in photo 7 adjacent to the ground clamp behind the operator's right leg. The strip is 61S-T6 plate, ¼ in. thick by 1 in. wide, cut to the length of the gussets and tack welded on one side.

Four gussets, spaced 90 deg apart and positioned directly over the channel sections of the flange, are then welded to the flange and drum. Refer to photo 7 for a view of the operation. The flange is, of course, in the vertical position. A gusset is shown inside the hub directly over the operator's head.

A rolled channel stiffener is also inserted to serve as a backing strip when the two hub halves are butt welded together. After the bronze drive gear has been bolted to one half of the hub on the outside, the nuts are welded to the inside of the flange (refer again to photo 7).

Now Reel Is Welded

The two halves of the reel, each including a flange and a drum, are now assembled on jig (photo 9) for final welding. The rolled channel serves to line up the two halves of the spool for assembly and to act as a back-up bar, spacer and strengthener. First the circumferential seam joining the two drum halves is welded, then the two longitudinal seams.

Final operations include recessing a portion in the hub where an eye will hold the end of the cable and the drilling of vent and drain holes in proper spots. The reel is primed with zinc chromate and is ready for shipment.

The small reel is made in much the same manner as the large reel except that plate stiffeners are used on the flanges instead of channel sections.

(Continued on page 46)

Ket Burns Too Fast

But the guy who got the acid treatment did a slow burn. That was one time when lead in the seat of his pants would have come in handy. Revenge, revenge!

BY CLEMENT HOWARD

FRED SMITH'S pipe shop was as busy as a beehive. Everybody was hammering and bending pipe or brazing saddle branches and fittings. The boys all worked very well together until a new guy was hired. Then came trouble.

You might know the troublemaker was a guy named Kettlehead. Old Ket was a practicing practical joker.

He was a past master at the art of giving a hot foot and was never happier than when he was making some unlucky victim look foolish. Nobody felt safe when he was around.

MAYHEM ON PANTS

One day our boy exceeded his own past efforts. He lifted a curved 8-ft length of 5-in. pipe full of cut acid from a vat. The acid was used for cleaning flux from silver-brazed joints. Believe it or not, Ket dumped the pipeful on one poor guy's rear. Then, playful-like, he grabbed the fresh-water hose and really soaked the poor guy on the grounds that he was burning up.

Didja ever stand fully clothed and let some guy turn a hose on you? The worst of it was, though, the water didn't do a thing to the acid. It kept right on working. By quitting time, the poor guy had to leave the shop by a rear gate holding a piece of plywood where the seat of his pants should have been. Even the back side of his underdrawers was gone.

This little gem got Ket in bad with everyone. In fact, a bunch of the boys got together and held a committee meeting for the sole purpose of cutting Kettlehead down to size. They knew Ket was a braggart so they figured they'd get him to stick out his neck right on the chopping block.

This shop had a little department that specialized in welding lead. The erroneous but commonly used term is lead "burning." The oldtimers didn't think Kettlehead knew very much about lead, so one of them asked him to do a little job.

Ket says, "Sure I can, Buster, I can weld it with my eyes closed." Bragging as usual, but without any past experience to back him up! The fellow produced a small 3 by 24 by 24 in. flat wooden box, used aboard ship to store batteries, and up comes another guy with a sheet of lead 1/16-in. thick. This he cuts up and places the strips in the box to form a liner to protect the wood from the battery acid. Then he says to Kettlehead, "Weld them together."

Now comes the fun! Old Ket grabs an oxyacetylene torch with a 1/16-in. orifice in the tip and starts to weld the edges like it was any ordinary job. Boy, oh boy! It didn't take more'n ten seconds with that big oxyacetylene tip, and there was a hole as big as your fist in the lining. Ket kept his head down so none of the guys could see his face. His ears were red as fire!

It didn't matter what size of tip he used or how he adjusted his torch. When he moved to another seam, he got the same end results — more holes! Did the gang ever get a good belly-laugh out of that!

A half dozen holes later, Ket's neck and elephant ears had taken on a rosy hue that looked like the forerunner of an attack of apoplexy. He was choking and coughing from the smouldering wood he'd almost set on fire, and tears were pouring out of his eyes, making hissing sounds as they fell on the lead.

LADY WAS FOR BURNING

About that time, the guy who had thought up this program signalled to a woman helper to come over. He whispered something in her ear, and she shoved Old Ket out of the way, saying "Move over, Buster, and make way for a gal that can weld."

The next thing you know she came up with a three-foot length of 1/16-in. ID rubber hose. To one end, she attached a regular welding torch. To the other end, she attached a welding tip with the smallest orifice made. She grabbed a lighter, held the tip down under the bench and lit it. When she had an adjustment she was satisfied with (it took several minutes), she put that tiny tip down on a seam and started to weld what was left of the lead. She held the tip down real close, so close, in fact, that you could hardly see the flame at all, but, boy, she welded those lead seams together beautifully! Not one hole did she burn in the lead.

"You jerk, Kettlehead! How am I ever going to get home this way?"

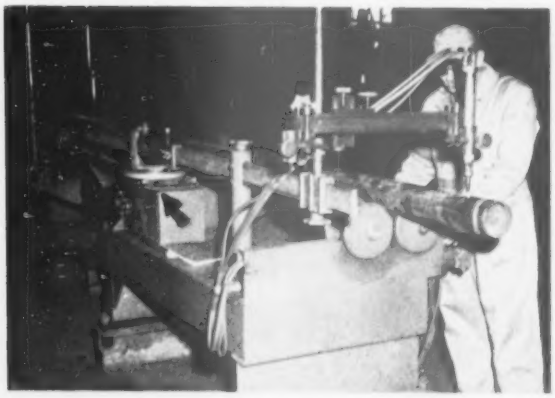
By the time she had welded a foot or so of seam, Old Ket was redder than ever. He'd have blown a fuse if he'd had one. Finally, he threw down his torch and stalked out of the shop. Some of the guys darn near got their lungs knocked loose from the pounding they were giving each other's backs.

ACETYLENE WON'T WORK

If Ket had been a decent sort of guy, someone might of wised him up that the gal was using hydrogen instead of acetylene. It takes such a small flame to fuse thin lead sheets that an oxyacetylene flame will not burn. It just keeps popping and going out. An oxygen-hydrogen mixture when it is used with a very small tip produces a flame that won't go out or pop. However, it is so hard to see that the weldor has to hold the tip in a dark place to adjust the volume.

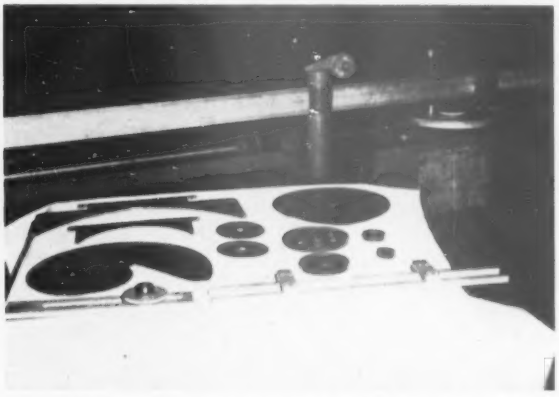
The lady had been especially trained to burn lead and was regularly employed in the company's lead shop, a small building separate from the main plant.

Poor Ket! The shame of being shown up by a dame!

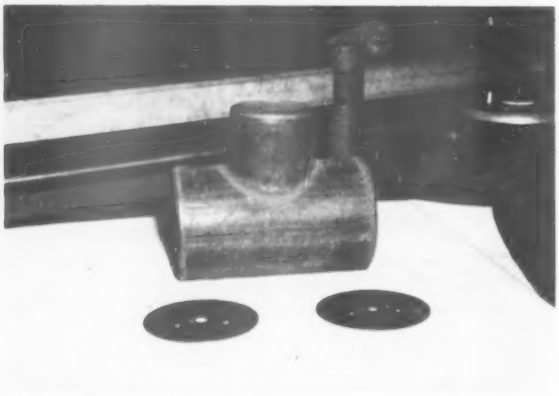


1—TWO torches are mounted above a 20-ft-long bed with turning rolls. Arrow shows the location of cam

2—ROUND holes are cut as needed for any T-joint or angle connections. An accurate fit-up is provided



3—CAMS and change gears for different jobs. The roller-and-bar assemblies (front) are for large miters



4—REDUCING tee with two cams. The right cam was used to cut the branch pipe, left cam the header

Straight Cut-offs, Bevels or Holes Are Cut by

Precision Pipe Cutter

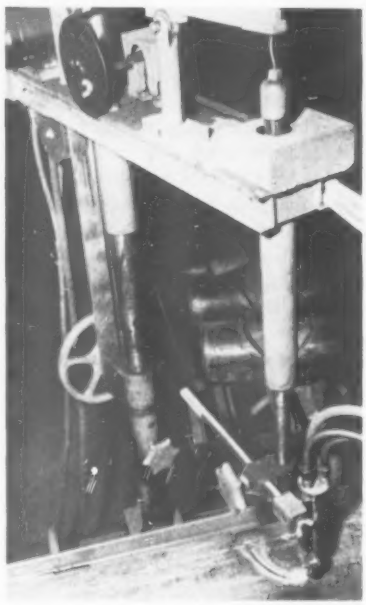
BY WILLIAM C. HENZLIK

A LARGE midwestern refinery requires considerable quantities of welded piping for new construction and maintenance work. Most piping assemblies are composed of lengths of pipe beveled at the ends and welded to prefabricated welding fittings such as elbows, tees or flanges. Frequently, however, intersections are formed directly between the pipe elements without the use of welded fittings. This makes it necessary to prepare lateral, tee or miter intersections. Most of the piping material is of a metallurgical composition that can be flame-cut for edge preparation.

To make a straight cut-off, the former practice was to wrap a piece of flexible material about 3 in. wide and having a straight edge around the pipe about 1½ times. The cut-off was marked with a soapstone crayon, and the pipe was then cut and beveled manually, using an oxyacetylene cutting torch. Miters, tees and laterals were marked from templates or other special tools and were also manually flame-cut. These methods were slow, and the finished job had room for improvement.

Now Done by Machine

A unique flame-cutting machine greatly simplifies the preparation and



5—SPLINED shaft that rotates torch is moved up and down by the cam at top to meet contour changes

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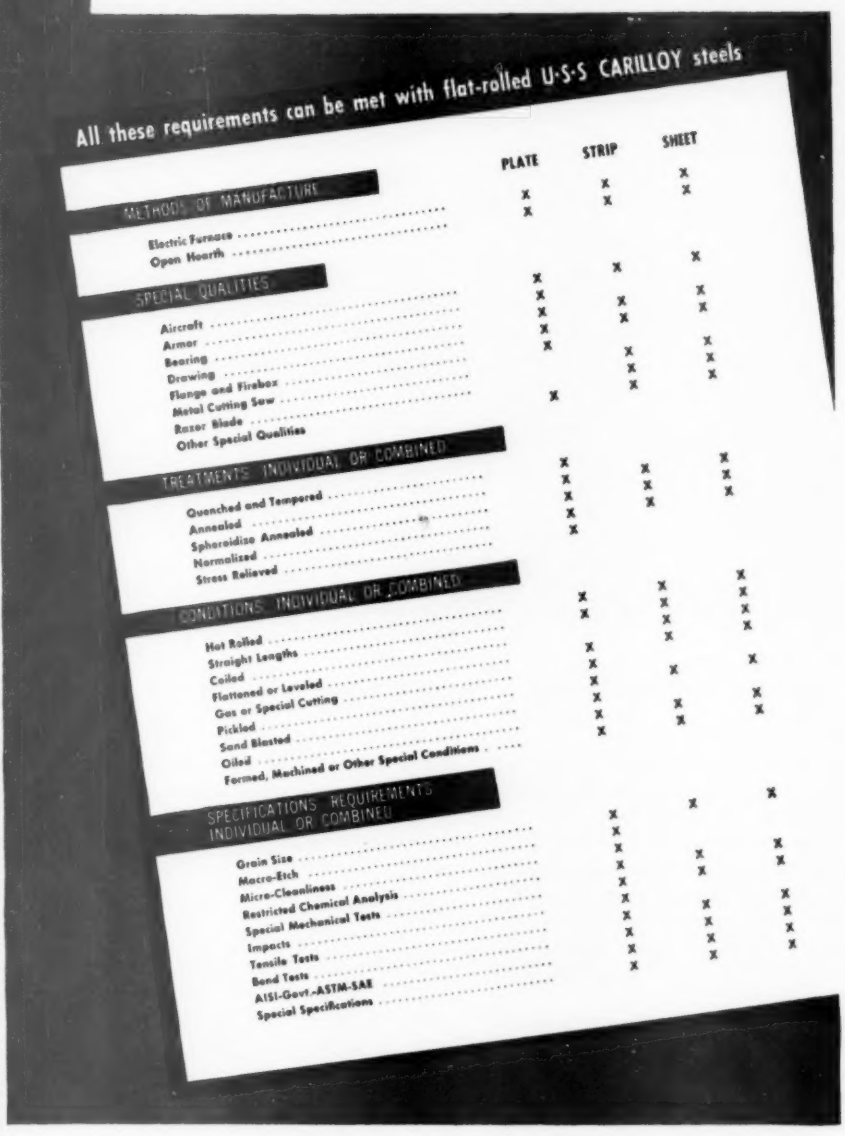

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produces an excellent, uniform joint for welding. This machine has a 20-ft-long bed (photo 1) and utilizes two torches to produce almost any contour or hole on piping up to 24-in. OD. Some of the different types of intersections that can be cut are shown in photo 2.

How It Works

In operation, the near torch of the machine (see photo 1) can be locked in position to make straight cut-offs at any desired bevel angle while the pipe is being rotated by the turning rolls on which it rests. To make more complicated intersections such as miters, tees or laterals, the proper cam is selected and fastened in place by two cap-screws turned in finger-tight. This cam is shown by the arrow in photo 1. It is selected from a chart furnished by the manufacturer.

It is also necessary to install the proper set of change gears, as designated by the manufacturer's chart. These change gears are retained by wing nuts and can be seen fastened to the vertical section of the housing below the cam in photo 1. It takes only about one minute to prepare the machine to make a cut. The gears so time the cam that it revolves once while the pipe is making one revolution. The cam pushes a follower, which moves the torch longitudinally through the rectangular torch bar.

Photo 3 shows a representative group of cams and change gears. These are used to cut intersections in piping up to 24-in. OD, the maximum capacity of the machine. The roller-and-bar assemblies appearing in the front of this photo are for cutting large miters.

A reducing tee intersection is shown in photo 4 with the cams used to produce it. The branch piece was prepared by using the cam to the right in the manner previously described. The hole in the header was prepared by using the cam to the left and the far torch shown in photo 1.

Holes through Pipe

A close-up of the hole cutting attachment is shown in photo 5. The cutting torch can be set and locked to cut a hole of any desired radius. The torch is rotated by means of a splined shaft, which is moved up and down by means of the cam (shown at the top of photo 5) to follow the contour of the header.

This pipe-cutting machine has produced rapid, accurate pipe cuts. The accurately prepared parts it produces make possible quicker fit-up and give machine accuracy to the welding groove. This in turn keeps the amount of weld metal to a minimum.

* * *

Acknowledgment is made to the Vernon Tool Co., Ltd., Alhambra, Calif., for some of the technical information included in this article.

HALF-MILE WELDED RAILS

(Continued from page 33)

cycle was determined by the length of time it takes to complete a weld.

Normalized after Welding

At the next station (photo 5) the weld was reheated to a temperature of 1,500 to 1,550 F. An oxyacetylene-flame-equipped normalizing machine relieved any stresses that might have resulted from the pressure welding. Then the weld was allowed to cool to atmospheric temperature.

Even yet, the welding sequence had not been finished. The rail head was still in the rough upset condition. It moved on to station No. 5, where two workmen ground the top and sides of the rail flush and smooth. This job was done by an engine-driven semiportable rail grinder.

Next the joint was checked by means of a magnetic-particle inspection (photo 6), which was also done at the grinding station. If the rail satisfactorily passed this test, a winch pulled it on the train (photo 7). Other winches took up the load and pulled the rail forward as it advanced through the cars. To keep the welded rails close to one another as they were loaded, an occasional workman was assigned the job of guiding them into place.

Before too long, the eight half-mile rails were loaded and running around an 11-degree curve (photo 8). For safety's sake, two idler flat cars were placed at each end of the train. One of these flat cars carried a falsework to prevent damage in the event of rail slippage. They were followed or preceded, as the case might be, by a car loaded with gravel as an additional safety feature. The shipment wound its way through the Rocky Mountains without incident, demonstrating the flexibility and durability of welding, even on rails that weigh 140 lb to the yard.

MIG-WELDED MINESWEEPERS

(Continued from page 42)

The frame to hold the small reel is made of 2½ by 2½ in. by 3/16-in. thick angles. Top and bottom plates are ½ in. thick. Most welds are fillets. The axle running through the hub is 3-in. OD pipe with a ⅜-in. wall. Solid ends are welded in.

Here Are the Details:

Large reel: Flange is 11 ft 3 in. in diameter.

Pipe edge on flange is 1½-in. diameter extra-heavy aluminum pipe.

Hub is cast aluminum.

Drum is 5 ft 6 in. in diameter and 5 ft 8 in. long.

Gear drive is bronze.

Small reel: Flange is 3 ft 8 in. in diameter.

Pipe edge on flange is 1½-in. diameter extra-heavy aluminum pipe.

Hub is cast aluminum.

Drum is 2 ft in diameter.

Most of the welds are made at a speed of 2½ to 4 ft per minute, using a current setting of 280-290 amp and a 1/16-in. filler wire of 43S aluminum. The shielding gas is a helium-argon mixture, flowing at a rate of 20-40 cfh.

On the basis of the results it has achieved at the Combined Equipment Co. and the Backus Machine Co., the Mig welding process has established itself as virtually mandatory for the fabrication of non-ferrous defense items on which a large amount of welding must be done.

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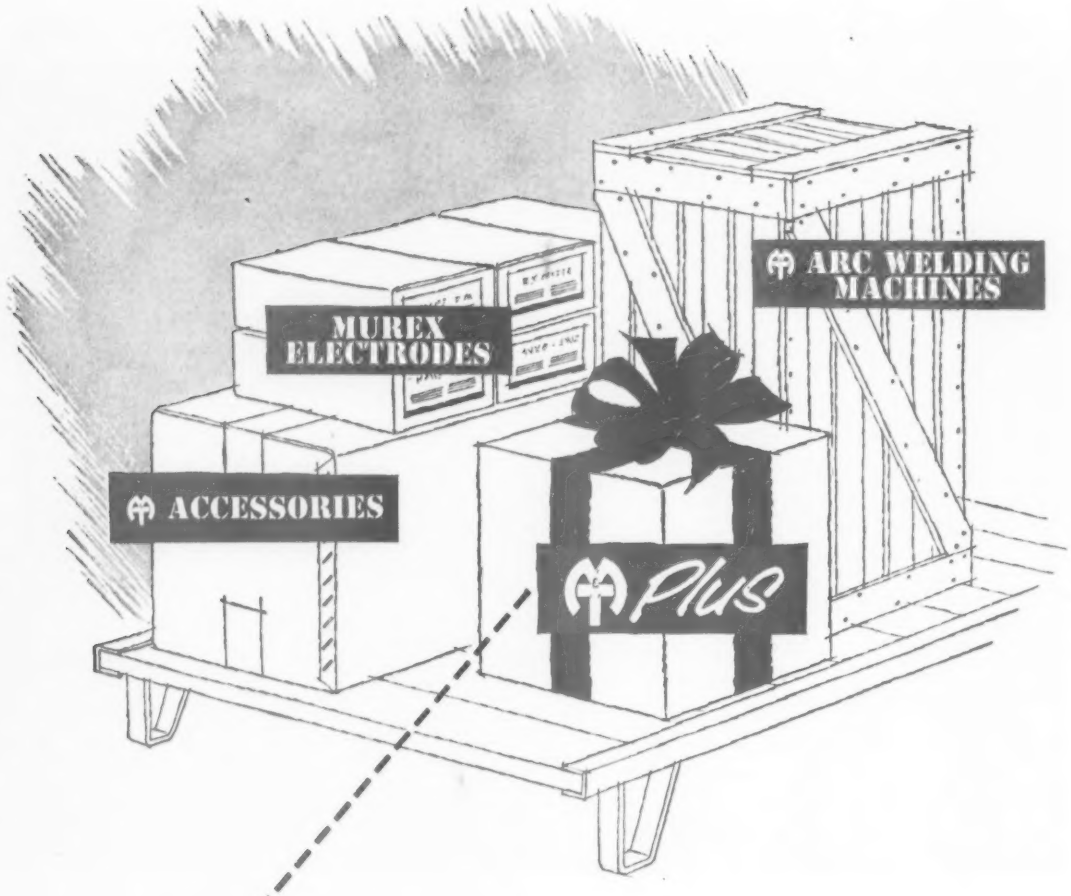
AIRLESS BLAST CLEANING



YOU GET *INTANGIBLES*, TOO — at M & T

EXPERIENCE — *Your M & T representative is a seasoned, practical welding engineer*

CARE — *eager and able to meet your welding needs and consult on your welding problems*

SERVICE — *promptly and efficiently.*

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METAL & THERMIT CORPORATION

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MUREX ELECTRODES • ARC WELDERS • ACCESSORIES

- DETINNING
- THERMIT WELDING
- METALS and ALLOYS
- ARC WELDING — Materials and Equipment
- CHEMICAL and ANODES for Electrotinning
- CERAMIC OPACIFIERS
- STABILIZERS for Plastics
- TIN, ANTIMONY and ZIRCONIUM CHEMICALS

Welding Info-Aids . . .

1 GAS-SHIELDED WELDING—General Electric Co. This illustrated 8-page brochure GER-819 contains information on the development, design and manufacture of equipment for the consumable-electrode gas-shielded welding process. It is a reprint of a paper presented before the American Welding Society by R. W. Tuthill of the G-E Welding Department.

2 WELDOR'S VISE—Belmont Abrasives. 4-page booklet and 1-page sheet tells of the "Grampus" vise for welding right angles accurately. The new hand vise sets mitred angle, channel, T and H profiles, rounds, tubes and sections at right angles to each other. Heat from arc or flame does not affect the handle (lock screw), which is protected by a shield.

3 PIPE CUTTER—H & M Beveling Machine Co. 4-page brochure describes flame cutting and beveling machines that can cut pipe as large as 36 in. in diameter. 1-page sheet tells of reduction in weights of the Nos. 3, 4 and 5 cutters.

4 WELDING ACCESSORIES—Tweco Products Co. "Twecolog No. 9" is 12-page catalog listing descriptions and prices of electrode holders, ground clamps, cable connectors and other welding and cable accessories.

5 WELDING GUN — Air Reduction Sales Co. Leaflet lists technical data on "Aircospot" gun. This lightweight inert-gas spot welder uses a 3/32 in. non-consumable thoriated tungsten electrode and an inert-gas shield. Unit consists of hand gun, control panel and necessary hoses and cables.

6 RENEWABLE TIP END — Evans Machine Co. Construction and principles of firm's adapters and tip ends for cutting torches are explained in new literature. Evans has introduced a new tip and adapter that helps cut down replacement of welding tips. Adapter becomes part of the torch; only the tip end need be renewed for perfect cutting tip.

7 SAFETY EQUIPMENT — Chicago Eye Shield Co. 64-page catalog No. 27 describes variety of protective equipment for the head and eyes. Illustrated are weldors' goggles, helmets, shields, etc. Book is primarily designed for man in charge of safety.

8 BACK-UP FLUXES—Solar Aircraft Co. 16-page booklet PR753 describes back-up fluxes for mild and alloy steels. Contains drawings showing source of common problems in alloy welding, and describes methods of using the fluxes to obtain faster, better welds. Application chart indicates proper flux to use on various types of steel with a number of welding methods.

9 WELDING COSTS — The Lincoln Electric Co. "The Case of the Ailing Weldollar" is the title of a 12-page illustrated booklet that presents an analysis of the basic causes of high costs and suggests ways for reducing them. Labor and overhead comprise almost 88% of the cost of welding, according to the analysis.

10 LIMIT CONTROL—Mullenbach Electrical Mfg. Co. Circular describes new "Gastrol," an automatic control for all inert-gas welding. The device limits the flow duration of both gas and water to the necessary welding and cooling periods. For use with a-c or d-c welders.

TO OBTAIN: manufacturer's catalog or bulletin described on this page, use the card sections printed below. Insert number of the item or items that interest you. THE WELDING ENGINEER will ask manufacturers to send the information requested.

Each card section must be completely filled out. Do not use ditto marks. These cards are not good after April 1, 1954.

How to obtain manufacturers' literature:

Fill out card section and write in number of item as shown at right:

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Name John Smith
Company Rex Mfg. Co.
Address 3217 Lewis Ave.,
Chicago 16, Ill. Title Engineer
THE WELDING ENGINEER

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Company.....
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..... Title.....
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11 WELDING PROCEDURES—Eutectic Welding Alloys Corp., 32-page "DirectoRod Guide" gives recommendations for more than 300 types of metal-joining operations. The booklet is divided into sections, each section dealing with a specific base metal. A chart at the end of each section lists electrodes, alloys and fluxes to be used on that metal.

12 HARDNESS TESTING—Steel City Testing Machines Inc. 8-page Bulletin B-953 describes and lists specifications of various models of Brinell hardness testers, including a portable hardness testing hammer.

13 HARDFACING ROD—Victor Equipment Co. 4-page pamphlet (Form 320) describes "Victortube," fabricated hardfacing rod containing 60% Victor tungsten carbide in various mesh sizes for acetylene application. Rod and mesh sizes are listed.

14 WELDING DATA—Wall Colmonoy Corp. 3-page illustrated Data Sheet No. 33 describes application of Colmonoy "No. 1" alloy to the hardfacing of a cast-steel catalyst slide-valve gate in a refinery catalytic cracker. 2-page illustrated Data Sheet No. 35 describes four typical applications of "Sprayweld" in the petroleum industry.

15 ULTRASONIC TESTING—Sperry Products, Inc. 8-page illustrated Bulletin 50-105 describes the "Reflectoscope," non-destructive testing instrument that produces ultrasonic waves. It is used to test a variety of metals and materials for surface and internal defects. It can be used to inspect welds for serious discontinuities.

16 TITANIUM — Mallory-Sharon Titanium Corp. The problem of developing good alloys for defense needs is discussed in "Taming Titanium," an 8-page reprint of an article that appeared in *Ordnance* magazine.

17 WELDING BUMPER GUARDS—Sciaky Bros., Inc. Vol. 3 No. 8 of "Resistance Welding at Work" tells how automobile bumper guards are spot welded using Sciaky resistance welders. The manufacturer produces more than 3,000 buffers daily, each buffer receiving two mounting brackets fastened with two spot welds each.

18 TUBE CHART—Amperex Electronic Corp. 3-color chart, 15 by 16½ in., makes possible quick selection of Amperex rectifier, thyratron and ignitron tubes. Typical rectifier circuits and other calculation factors are shown on reverse side of chart.

19 HARDFACING ELECTRODE—Stoody Co. Descriptive literature tells of "Coated Tube Stoodite," an electrode for hardfacing equipment used in many industries. Principal alloying agents are chromium and molybdenum, and the electrode is readily weldable to carbon and alloy steels, including manganese steel.

20 METAL SHEARS — O'Neil-Irwin Mfg. Co. 14-page illustrated booklet points out faster, easier ways of selecting, setting up and operating "Di-Acro" shears. They are capable of shearing heavy gages of aluminum, chrome molybdenum, leaded brass, stainless steel and other spring-tempered materials.

21 DUST CONTROL—American Wheelabrator & Equipment Corp. Illustrated Bulletin 392 tells how dust can be controlled in metal-working industries. Particular attention is given to use of cloth-tube-type dust collectors in the ventilation of grinding and annealing operations, sprue mills and blast-cleaning equipment.

22 ELECTRICAL CONNECTIONS—Erico Products, Inc. 3-color, 76-page illustrated catalog describes cable and wire connections made by the "Cadweld" process, which is a method of welding copper to copper or copper to steel without need for outside source of heat. Pictured are various welders and types of connections made with each. Also included are instructions on welding procedures.

23 RADIOGRAPHY—Industrial X-Ray, Inc. "Quality Control Through Radiography" is the title of 12-page booklet which illustrates case histories of radiographic testing. Included are sections on how this non-destructive testing tool means better welds and how it serves in weld repairs.

24 ELECTRODES—Weldwire Co., Inc. 8-page pamphlet WB-8/1/53 lists prices of "Weldbest" electrodes for stainless, low-alloy steels, bronzes, high-nickel alloys and specially engineered applications.

25 CABLE CONNECTORS—Cam-Lok Division, Empire Products, Inc. 2-page Bulletin 110 lists specifications of firm's welding cable connectors, terminal connections, special adapters and cable lugs. Insulation on the connectors is secured with a fiber pin, which makes arcing impossible.

26 TUBE-FIRING CONTROL — Weltronic Co. Bulletin 64-S gives details of non-synchronous controls featuring a new timer. Incorporated in the timer is a device to prevent firing of the ignitron tubes in the event any of the sequence tubes fail to conduct or become shorted. Weld time depends solely upon the discharge of a capacitor, not upon conduction of a tube.

27 PORTABLE X-RAY UNITS—Holger Andreasen, Inc. 4-page illustrated booklet in three colors describes "Andrex" portable X-ray units for radiographic inspection of welds in finished structures.

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Characteristics of Magnesium Alloys*

	Alloy No.			Nominal Composition (Mg = Remainder)			Heat Treatment	Specific Gravity (75° F.)	Weight, Lb./Cu. In.	Melting Point, F.	Thermal Conductivity C.G.S. Units (100-300°C.)	Electrical Resistivity Microhm-Centimeters (20°C.)	Tension						Compression M Psi.		Bearing Strength M Psi.		Shear M Psi.	Fatigue (1) M Psi.	Brinell	Rockwell E.
													Ultimate Strength M Psi.		Yield Strength M Psi.		% Elong. in 2 In.		Ult. Str.	Y'd. Str.	Ult.	Y'd.				
	ASTM	DOW	AMC	Al.	Zn.	Mn.							Typ.	Min.	Typ.	Min.	Typ.	Min.								
Sheet	AZ31X	FS1-O	C52S-O	3.0	1.0	—	O	1.77	0.064	1160	0.23	10.0	37	32	22	18	21	12	—	16	75	36	21	12	56	67
		FS1-H24	C52S-H24	3.0	1.0	—	H24	1.77	0.064	1160	0.23	10.0	42	39	32	29	16	4	—	27	78	53	23	14	73	83
		FS1-F	C52S-F	3.0	1.0	—	F	1.77	0.064	1160	0.23	10.0	37	32	22	18	21	12	—	—	75	36	21	—	—	—
	M1	M-O	3S-O	—	—	1.2	O	1.76	0.064	1200	0.30	5.0	33	28	18	13	16	12	—	12	60	28	18	9	48	55
		M-H24	3S-H24	—	—	1.2	H24	1.76	0.064	1200	0.30	5.0	37	32	28	22	7	4	—	20	—	—	—	10	56	67
		M-F	3S-F	—	—	1.2	F	1.76	0.064	1200	0.30	5.0	33	28	—	—	—	12	—	—	—	—	—	—	—	—
Bars	AZ31X	FS1	C52S	3.0	1.0	—	—	1.77	0.064	1160	0.23	10.0	37	35	26	22	12	10	60	15	65	35	19	14	45	57
	AZ61X	J1	C57S	6.5	1.0	—	—	1.80	0.065	1145	0.19	12.5	45	40	32	26	14	11	—	20	76	44	20	18	58	70
	AZ80X	O1	C58S	8.5	0.5	—	—	1.80	0.065	1130	0.18	14.5	48	43	32	28	12	9	—	22	76	50	22	18	60	78
	M1	M	3S	—	—	1.2	—	1.76	0.064	1200	0.30	5.0	34	30	26	20	9	3	—	12	56	28	18	9	44	45
Shapes	AZ31X	FS1	C52S	3.0	1.0	—	—	1.77	0.064	1160	0.23	10.0	37	35	26	22	12	10	—	15	65	35	19	14	45	57
	AZ61X	J1	C57S	6.5	1.0	—	—	1.80	0.065	1145	0.19	12.5	44	40	28	22	14	10	—	19	—	—	—	—	64	76
	AZ80X	O1	C58S	8.5	0.5	—	—	1.80	0.065	1130	0.18	14.5	48	43	32	28	12	9	—	22	76	50	22	18	60	77
	AZ80X	O1-T6	C58S	8.5	0.5	—	T6	1.80	0.065	1130	0.18	14.5	52	48	36	30	5	4	—	33	90	62	24	19	82	88
	M1	M	3S	—	—	1.2	—	1.76	0.064	1200	0.30	5.0	34	30	26	20	9	3	—	12	56	28	18	9	44	45
Tubing	AZ31X	FS1	C52S	3.0	1.0	—	—	1.77	0.064	1160	0.23	10.0	35	34	23	16	12	8	—	15	—	—	—	—	46	51
	AZ61X	J1	C57S	6.5	1.0	—	—	1.80	0.065	1145	0.19	12.5	41	36	20	16	13	7	—	15	—	—	—	—	50	60
	M1	M	3S	—	—	1.2	—	1.76	0.064	1200	0.30	5.0	32	28	20	—	6	2	—	10	—	—	—	—	42	41
Castings	A-10	G	240	10.0	—	0.1	F	1.81	0.066	1100	—	—	22	18	13	10	2	1	48	13	—	—	17	10	54	65
				10.0	—	0.1	T4	1.81	0.066	1100	—	—	33	29	12	10	8	5	50	12	—	—	19	12	52	62
				10.0	—	0.1	T6	1.81	0.066	1100	—	—	34	29	19	17	2	—	54	19	—	—	21	10	69	80
	AZ63	H	265	6.0	3.0	—	F	1.83	0.067	1135	0.18	11.5	29	24	14	10	6	4	45	14	65	42	18	11	50	59
				6.0	3.0	—	T2	1.83	0.067	1135	0.18	11.5	29	24	14	10	5	2	—	—	65	42	19	11	—	—
				6.0	3.0	—	T4	1.83	0.067	1135	0.18	11.5	40	34	14	10	12	7	46	14	70	42	19	—	55	66
				6.0	3.0	—	T6	1.83	0.067	1135	0.18	11.5	40	34	19	16	5	3	50	19	80	56	21	14	73	83
	AZ92	C	260	9.0	2.0	—	F	1.82	0.066	1110	0.16	16.0	24	20	14	10	2	1	55	14	60	48	19	11	65	77
				9.0	2.0	—	T2	1.82	0.066	1110	0.16	16.0	24	20	14	11	2	—	—	—	60	48	19	11	65	77
				9.0	2.0	—	T4	1.82	0.066	1110	0.16	16.0	40	34	14	10	10	6	60	14	75	48	20	14	63	75
				9.0	2.0	—	T6	1.82	0.066	1110	0.16	16.0	40	34	23	18	2	1	70	23	85	65	21	13	84	90
	M1	M	403	—	—	1.2	F	1.76	0.064	1200	0.30	5.0	14	12	4.5	—	5	3	27	4.5	—	—	11	—	33	3
	AZ90	R	263	9.0	0.6	—	—	1.81	0.066	1120	0.17	17.0	33	—	22	—	3	—	58	22	—	—	20	14	60	72

Modulus of Elasticity—6,500,000 psi. • Coefficient of Thermal Expansion—0.0000145 inch per inch per degree F (68 to 212°F). • Modulus of Rigidity—2,400,000 psi. • Poisson's Ratio—0.35.

NOTES: (1) Based on 500 million cycles of completely reversed stress as determined on the R. R. Moore type of machine and specimen. • B. & P. designations follow the ASTM System.

Revised Nov. 1953

*Reprinted from the *Magazine of Magnesium*, Brooks & Perkins, Inc

on the job . . .

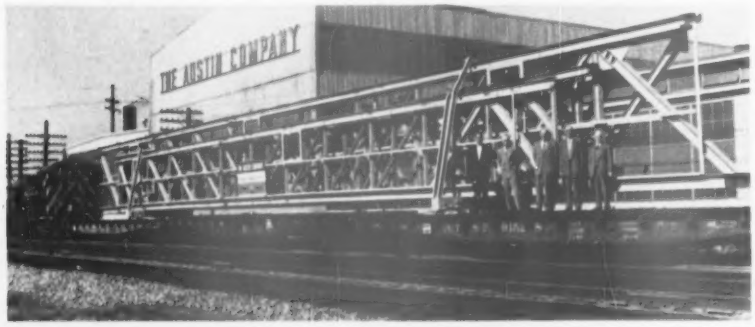
WELDED boiler products are floodlighted to catch attention after dark

No Roof, No Walls . . . . . *By William R. Palmer*

A SHOWROOM would be a needlessly expensive luxury to F. R. Robinson, proprietor of the Arc-Way Steel Boiler and Welding Co., who is located in rural North Hampton, several miles out of Portsmouth, N. H. Nevertheless, Robinson wanted some way to display his welded boilers and heaters. Solution was a display room that has neither walls nor a roof.

Robinson simply poured a six-inch concrete slab to serve as a platform for the boilers and heaters. All of the exhibits were waterproofed by spraying them with aluminum paint, which also helped to catch the eye of motorists coming down the highway (the heavily traveled U. S. 1). Electrical piping was set into the concrete when it was laid to serve all-weather spotlights, which make the outdoor display even more spectacular after dark.

Mr. Robinson feels that this outdoor showroom is one of the main reasons why his business has been growing steadily.



THREE flatcars hold 135-ft truss designed by The Austin Co., Cleveland

612 Miles to Construction Site

AN ALL-WELDED steel truss to cover a 135-ft span made a safe journey by rail from Cleveland, O., to Jersey City, N. J. The truss was transported by the Nickel Plate Road, daylight only. At speeds under 20 miles an hour, the truss took eight days to make the 612-mile trip to the construction site. It is said to be the longest structural-steel truss ever to be shipped by rail from Cleveland.

The big welded truss is part of an intraplant materials-handling installation, which will connect several multiple-story buildings of the Colgate-Palmolive plant at Jersey City. It was fabricated by The Austin Company's structural steel fabricating division, Cleveland, and is distinguished by a complete absence of joint plates. Its design is of the H-section type, said to reduce its weight and increase its rigidity.

Five other trusses of similar design but covering shorter spans were loaded and shipped with the 135-ft truss. The shipment weighed about 45 tons and required three flatcars (one 45-ft and two 52-ft cars).

The conveyor for which these trusses are designed will be located 60 to 80 ft above ground.

* * *

Photo from Stow Mfg. Co.

Grinding Large Frames

GOVERNAIR CORP., Oklahoma City, Okla., was faced with the problem of grinding welds on large frames. The operators were using heavy electric disc sanders with abrasive discs. Though this grinding tool was portable, it was difficult to maneuver in tight spots, and operators quickly became fatigued.

A shift was made to a flexible-shaft grinder, as shown in the above picture. This cut the cost of the grinding and reduced operator fatigue to a minimum.

* * *

Welded Road Sign

IN NORTHEASTERN Arizona, wind, weather and target-practicing cowboys take their toll of road signs. A permanently fixed, long-lasting sign of rod and pipe was made by welders of the Vanadium Corp. of America to mark the location of Monument No. 2 mine. This sign (picture above) was fabricated from ½-in. round steel rod and ¾-in. steel pipe and painted with aluminum paint. It has proved to be a valuable aid to the traveler in this lonely country.

NICKEL-ARC

FINEST ELECTRODES MADE
for MACHINABLE WELDS
on CAST IRON

IF YOU MAKE, USE, or ASSEMBLE IRON CASTINGS, NICKEL-ARC CAN SAVE YOU TIME, LABOR, and MONEY

Nickel-Arc electrodes are designed especially for smooth, fast welding of all types of cast iron. The weld deposit is sound, crack free without checks or porosity and is machinable in the "as welded" condition.

Nickel-Arc is easy to handle because its special core wire and coating produce a low penetrating, easy-to-control, arc with a smooth steady metal transfer and good wash characteristics. What's more, this special core wire and coating allow a lower amperage range reducing the possibility of hard carbides forming in the area adjacent to the weld.

Find out how Nickel-Arc can help solve your cast iron welding problems. Order a 10 pound can from your Alloy Rods Distributor . . . he has it in 3/16", 5/32", 1/8", and 3/32" diameter. For free literature write Alloy Rods Company, Dept. 22, Lincoln Highway West, York, Pennsylvania.

CHECK THESE NICKEL-ARC FEATURES

- Easy Slag Removal.
- Easy-to-control Arc.
- No Injurious Fumes.
- AC or DC Operation.
- All Position Welding.
- Smooth Bead Contour.
- No Preheating Required.

OVEN FRESH — Packaged in the familiar Alloy Rods red and yellow hermetically sealed metal container, every NICKEL ARC electrode reaches you in "oven fresh" condition.

ALLOY RODS COMPANY

Alloy Rods Co.

GENERAL OFFICES and PLANT • YORK, PENNSYLVANIA

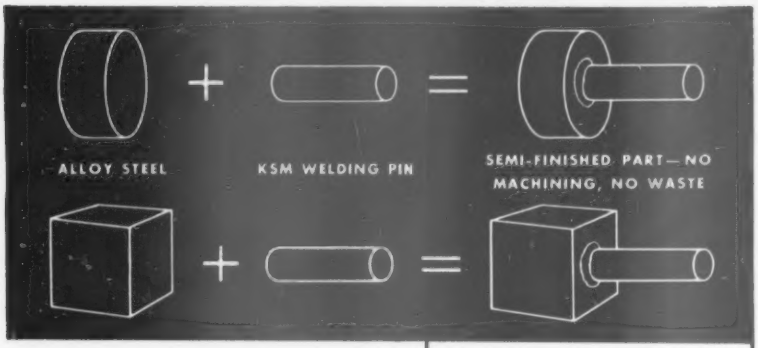
PACIFIC COAST SALES OFFICES and PLANT • EL SEGUNDO, CALIFORNIA

NO FINER ELECTRODES MADE . . . ANYWHERE

improved stud welding
through **K S M** engineering

A-MP SAVES

50% OF RAW MATERIAL...
70% OF PRODUCTION TIME
with switch to KSM ARC-WELDED PINS



Aircraft-Marine Products, Inc., Harrisburg, Pa., makers of solderless electrical connections and the tools for applying them, recently cut in half the material cost of two vital crimping-tool parts. They're also saving $10,500 per year (70% of the former cost) in machining time on indenter-and-nest sets alone—all through the adoption of KSM arc-welded pins, eliminating costly machining operations by stud-welding.

Using an automatic KSM production unit, your operator can weld as many as twenty studs a minute, accurately placed within .005"; and KSM studs, threaded, bent or plain, are available in many, *many* standard sizes—or can be engineered to your needs.

If you're dissatisfied with costly machining that KSM stud-welding could eliminate or simplify, A-MP's saving could well be *your* saving. Find out—write KSM Products, Inc., Merchantville 8, New Jersey.

HOW A-MP DID IT

Instead of turning each indenter and nest, including the shank, out of a single piece of costly alloy steel, expending half the raw material in the process, A-MP now stud-welds KSM pins to steel blocks half the previous size, saves valuable lathe time, gets results as good if not better. A simple jig in conjunction with an arbor-mounted stud-welding gun permits welding speeds up to six studs per minute.

KSM
STUD WELDING

Four Times as Much

A WELDING machine developed by welding engineers in the Torrance, Calif., plant of The National Supply Co. is said to multiply the volume of work that can be done by a man with a manual welding arc by approximately four times. Weld appearance is improved, defects almost eliminated.

A standard submerged-arc welding head is mounted on a boom, which travels on a carriage, as shown in the above picture. The speed of the carriage regulates the welding speed. Position of the welding head is adjustable vertically and laterally, and angular positions may be provided by hinging the welding head on the end of the horizontal supporting arm. The base and track assembly is adjustable for fast alignment with the work. Track sections may be added if it is necessary to weld longer workpieces.

Two 600-amp welding generators supply current to the welding wire. A large wire, 3/32 in. to ¼ in. in diameter, is used for the heavy weldments manufactured in this plant. The flux is fed by compressed air.

* * *

Boiler Transplanted

BIG STEAM boilers have to be especially built for the job, and it takes about a year to make one. While the Colorado Fuel & Iron Corp. was erecting its new $30,000,000 seamless-tubing mill at Pueblo, Colo., CF&I engineers were looking around for an old boiler that could be converted for use in the new mill in a matter of weeks.

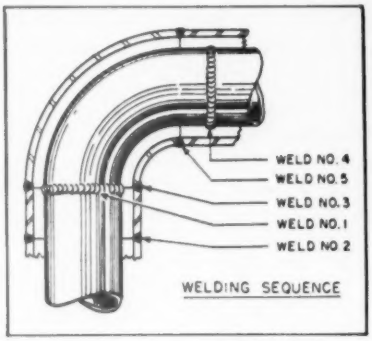
A suitable Walsh-Weidner sectional-head boiler was found in an idle oil refinery in Coffeyville, Kansas. Though Coffeyville is rather a long ways from Pueblo, the boiler was otherwise ideal: it was located close

to a railroad, and it was in a "like new" condition.

Oxyacetylene torches cut up the big boiler into movable sections, and it was shipped to Pueblo on five freight cars. Seventeen weeks later, it was on duty carrying its share of the total load. Two new 100,000-lb-per-hour boilers are now being installed to serve with the transplanted boiler.

The new CF&I tube mill is the first seamless-tube mill west of the Mississippi. It is expected to be an important supplier of tubing and casing to the oil and gas industries of the western United States and western Canada.

* * *



How to Jacket Fittings

WHERE jacketed piping systems are being installed, a simple and relatively easy way has been found to employ welding fittings for directional changes. The fabrication procedure was developed by the engineering service division of Tube Turns, Inc., Louisville, Ky. The jacketed fitting combination (see sketch) consists of long-radius and short-radius 90-deg elbows, which have closely matching centerline radii. On one end of the inside elbow is a tangent that extends beyond the corresponding end of the outside elbow. On the other end of the inside elbow a short piece of pipe is attached to facilitate the installation work. The welding sequence is given by the numbers in the sketch. It must be followed exactly.

This type of jacketed fitting eliminates flanged joints, except where piping must be disassembled. It permits more accurate temperature control and provides optimum flow conditions because of the streamlined piping.

COMING NEXT MONTH
77 Years of
Resistance Welding

Bridgeport No. 192 Low Fuming Bronze Rod

for quicker repairs... for regular production

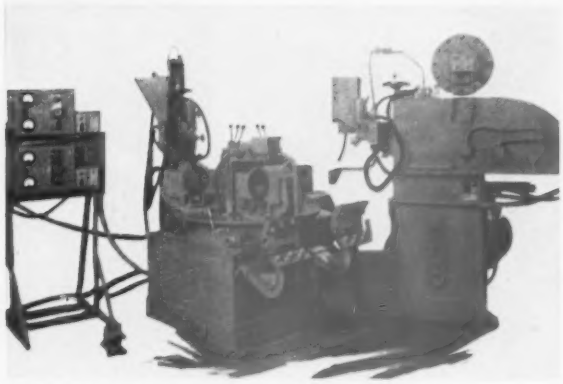
Braze-welding with Bridgeport's No. 192 Low Fuming Bronze Rod makes sound, lasting repairs quickly. Since only local heating is needed before this free-flowing rod begins to "tin," elaborate preheating setups and cooling are unnecessary—expensive down time is saved. What's more, braze-welds are frequently stronger than the original metal.

Bronze Welding Rod can be used for regular production and for building up of worn surfaces. In the photograph shown, the lugs on these wringer roll clutch plates have been formed by building up with No. 192 Low Fuming Bronze Rod. The entire story of braze-welding is in our booklet, "Bronze Welding Alloys." We will be glad to send you a copy.

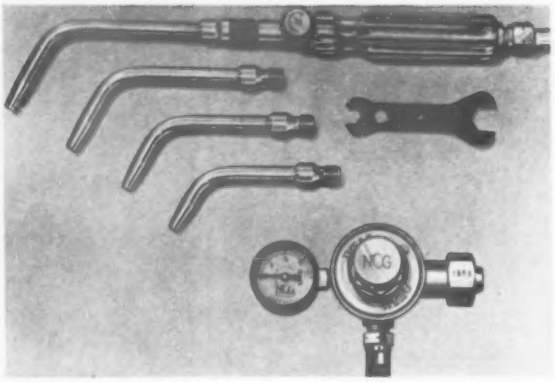
BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF
BRIDGEPORT BRASS

New Products . . .



DIESEL-engine liners are welded with this machine. It welds on the inside and outside of bearing shells



AIR-ACETYLENE apparatus is for quick repair work. It includes torch for brazing, soldering and heating

Bearing-Shell Welder

THIS machine is designed to make both internal and external welds in heavy-wall bearing shells. Manual air-operated flux back-up is built into the clamping fixtures for internal welding.

The operating and indexing cycles are completely automatic under operator control. Hydraulic power is used to index the table into the three positions against fixed adjustable stops. The index and welding motions are electrically interlocked to protect against improper sequencing.

Manual air-operated cast-bronze clamp shoes hold the work at each station. Other features include automatic light-beam gaging of the shell seam and automatic ejection of the welded bearing shell.

MORTON MFG. CO., Broadway and Hoyt, Muskegon Heights, Mich.

* * *

Automatic Welder

AN all-purpose automatic welder is the Leader "Model 700." Its heavy-duty head, with a 1,200-amp d-c source can also be used as three individual 400-amp manual welders. In addition to the main control panel, the machine has an operator's control panel located on the horizontal crossbar. The motorized pedestal has a 96-in. travel and rotates 360 deg. Locking and limit switch controls are included.

The 132-in crossarm has a variable speed, reversible drive motor (20 to 1 ratio) for carriage traverse with rapid traverse control. Another feature is a manual and automatic bead lapping control.

Wiring is furnished to facilitate three-phase, 220/440-volt, 225/115-amp connection at point of installation.

LEADER WELDING AND MFG. CO., 2418 Sixth St., Berkeley 2, Calif.

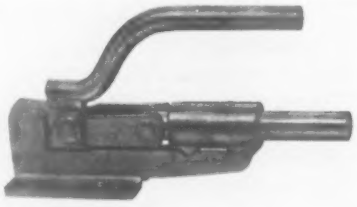
* * *

Welding Electrode

THIS new "CS" electrode is said to give good welds between steel and cast iron with good penetration and fusion. Though more economical, it won't do all that a nickel electrode does. There is almost a total absence of spatter with the "CS." The electrode contains nickel and copper and produces a tensile strength up to 65,000 psi. It is available in sizes of 1/8 and 5/32-in. diameters.

TENNESSEE FABRICATING CO., 1490 Grimes St., Memphis.

* * *



Toggle Clamp

CLAMPING pressure up to 3,000 lb can be achieved with this new "Caddy P-2" plunger toggle clamp. The horizontal clamp has extra-large pivot pins and is all welded. The manufacturer states the welded construction prevents the clamp from coming apart even after the pins have been excessively worn. An all-bronze plunger resists welding spatter.

ERICO PRODUCTS, INC., 2070 E. 61st Pl., Cleveland 3.

Maintenance Kit

QUICK maintenance and repair work on jobs where fusion welding is not essential can be accomplished with the "Sod-R-Braze" air-acetylene apparatus. The outfit consists of torch, tips, hose and adjustable regulator.

The torch can be used for brazing with silver or copper alloys, soldering and heating. Despite the fact that it uses no oxygen, it permits fast work, the manufacturer states. The torch has a grooved plastic handle, leak-proof valve and pilot light.

NATIONAL CYLINDER GAS CO., 840 N. Michigan Ave., Chicago 11.

* * *

Circle Cutter

PATTERNS are unnecessary when cutting circles with this new attachment, which is for use with the manufacturer's "Ultra-Graph" oxyacetylene-torch guiding machine. The attachment will cut circles from 2 to 26 in. in diameter. A two-step pulley provides a higher speed range for small-diameter circles.

HEATH ENGINEERING CO., Fort Collins, Colo.

* * *

Weldor's Test Kit

THIS new test kit for weldors conforms to Air, Navy, Ordnance Specification MIL-T-5021. It includes everything necessary for government certification of weldors. In addition to the necessary application forms, the kit consists of two clusters, one plate, two crosses, two sets of tubes, all made of chrome molybdenum.

CBC WELDING CORP., 422 E. 102nd St., New York City 29.

Lighter Pipe Cutters

A 40% reduction in weight has been achieved on the larger pipe-cutting and beveling machines manufactured by H & M Beveling Machine Co. The approximate weight reductions are: the "No. 3" machine (for 14 to 20-in. pipe) formerly weighed 89½ lb, now weighs 53 lb; the "No. 4" machine (for 22 to 26-in. pipe) was formerly 123 lb, is now 66 lb; the "No. 5" machine (for 28 to 36-in. pipe) was 155 lb, now weighs 95 lb.

H & M Beveling Machine Co., 311 E. Third St., Tulsa, Okla.

* * *

Aluminum-Bronze Flux

Primarily designed for use in welding light-gage aluminum-bronze sheet, this new flux is said to insure removal of oxides and secure full penetration in straight butt joints at lower welding currents and preheats.

"Ampco-Well" flux may be used with the inert-gas processes and bare "Ampco-Trode" filler rods in all grades. It should be mixed with alcohol and painted on all surfaces of the joint to be welded. The flux is available in 1-lb jars.

Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 46.

* * *

Weldor's Vise

Accurate right angles can be welded in a matter of seconds by using this "Grampus" vise. The new hand tool sets mitred angle, channel, T and H profiles, rounds, tubes and sections at right angles to each other.

Made of close-grained cast iron, the vise is so construced that heat from arc or flame can escape without affecting the handle, which also serves as the lock screw. The handle is provided with a protective shield.

Belmont Abrasives, 285 Newberry St., Boston 15.

IF IT'S A VALVE FOR WELDING— ROSS HAS IT

SMALL *Ross* VALVES SOLVE CONTROL PROBLEMS

Ross makes hundreds of valves especially designed for small, fast, single or double acting cylinder applications on all types of machine tools, jigs, fixtures, small punch presses and for remote pilot operation of large valves.

A. 600 series—three-way or four-way—hand and foot—¼" pipe—horizontal or vertical handle—single or double treadle.

B. 880 series—three-way or four-way—hand and foot—¼" and ⅜" pipe—horizontal or vertical handle—single or double treadle.

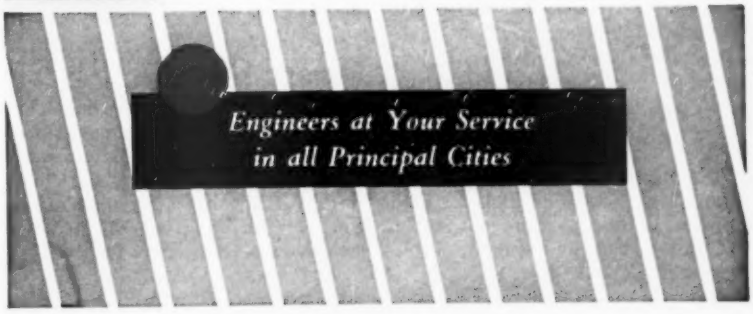
C. Inline direct operated solenoid — straight-way and three-way — normally open and normally closed —⅛" pipe.

D. Straight-way or three-way normally closed — ¼" pipe — various heads.

E. Four-way direct operated solenoid—¼" pipe—can be converted to three-way by plugging cylinder port.

Large or small—Ross has the most complete line of operating valves in the industry. Ask Ross for any air control information.

Ross CONTROL
OPERATING VALVE COMPANY
116 E. GOLDEN GATE AVENUE • DETROIT 3 • MICHIGAN



Diesel-Engine Welder

SPECIALLY designed for locations where electric power is not available is this Diesel-engine-driven arc welder of 300-amp capacity. It is powered by a two-cycle unit injection Diesel that features oil cooling, displacement blower and fuel filtration. The engine has a piston displacement of 141.8 cu in. and is rated at 67 hp at 1,500 rpm.

The welder's "Multi-Range Dual Control" permits the operator to make fine voltage-ampere adjustments right at the work, thus eliminating unnecessary steps between the machine and the work.

THE HOBART BROS. CO., Hobart Square, Troy 1, O.

* * *

Electrode Holders

SUSPENSION of the mechanism inside the handle of new "coolie" electrode holders is said to provide better ventilation, thus insuring cooler operation. The holders are offered in the straight-nose or offset pug-nose types. The metal parts are made of high-copper-content aluminum bronze. The cable is secured with a ½-in. set screw, or it can be attached by soldering.

The operating mechanism is covered and protected by the handle insulation. Heat-resistant pads for both jaws and holders are interchangeable.

CAM-LOK DIVISION, Empire Products, Inc., P. O. Box 98, Cincinnati 36.

Hardfacing Electrode

AFTER nearly two years of field tests, a coated tubular hardfacing electrode is now available. Its principal alloys are chromium and molybdenum, and it can be used to weld all carbon and alloy steels, including manganese steel. The weld deposit is said to exhibit high compressive and impact strength.

Deposits are semi-austenitic and are not affected by ordinary heat-treat methods. Under normal a-c or d-c welding procedures, the deposits show a Rockwell C hardness of 50 to 60. Properties are retained at temperatures up to 800 F.

STOODY CO., 11923 E. Slauson Ave., Whittier, Calif.

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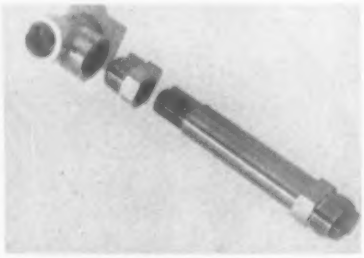


Dry Manifold Joint

SEALING compounds are unnecessary with this new dry differential manifold joint. It is said to provide a fluid-tight connection between two fluid conduits in the assembly of a manifold. The dry unsoldered joint can be used safely with highly flammable gases.

The joint consists of three special fittings: a socket, a nipple and a bushing. The socket is usually in a tee or elbow, and the thread of the nipple has less pitch than that of the socket. The pitch of the bushing's outside thread matches that of the socket, and its inside thread matches that of the nipple. The difference in threading makes it possible to obtain a tight joint by rotating only the bushing, leaving the nipple and socket stationary.

NATIONAL WELDING EQUIPMENT CO., 218 Fremont St., San Francisco 5.

* * *

Hinged Clamp

HINGE action permits this clamp to be fixed in the clamping position or dropped out of the way, although still ready for instant use. The bar clamp is provided with a hinge-plate on the foot end, enabling it to be mounted onto a flat underside surface.

ADJUSTABLE CLAMP CO., 426 N. Ashland Ave., Chicago 22.

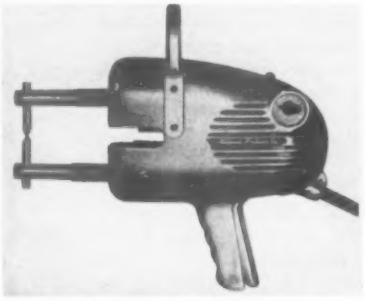
Rectifier Welder

DESIGNED specifically for powering submerged-arc, inert-gas and other types of automatic welding processes is this new 1,000-amp rectifier d-c welder. The unit operates on 3-phase, 60-cycle a-c power (240 or 280 volts). It has a preset stepless arc voltage range of 18 to 42 volts.

This is another of Glenn Co.'s constant-voltage welders that have preset arc voltages, which remain constant during welding. External voltage controls are unnecessary. Speed regulation of the rod-feed roll motor is the only outside control used.

GLENN CO., 3134 E. 10th St., Oakland 1, Calif.

* * *



Portable Spot Welder

ELECTRONIC timing control is built within a new portable spot welder that weighs only 26 lb. It will weld most alloys of aluminum sheets as well as plated metals. The weld interval may be set from one cycle to a full second. Output is in excess of 10 kva.

A pistol grip offers ease of operation and handling. A stand for mounting the welder, to enable it to be used as a foot-operated model, is also available.

AMPOWER PRODUCTS CO., 5737 W. 87th St., Oak Lawn, Ill.

New! FOR WELDERS WHO WEAR BIFOCAL GLASSES

PENOPTIC*

MAGNA-WELD LENS

REGAINS LOST BIFOCAL VISION

WITHOUT MAGNA-WELD LENS
Bifocal vision through helmet window is limited by improper alignment of window and bifocal segment.

WITH MAGNA-WELD LENS
Bifocal power is provided through entire window area, completely eliminating use of eyeglass bifocal segment.

Now... an effective optical aid which gives the welder who wears bifocal glasses the advantage of "full window" vision.

The Magna-Weld has lenses made of fine ophthalmic glass, precision ground and polished, and mounted in a sturdy frame which fits any standard welding helmet.

Magna-Weld comes in 2 sizes, 2"x4 1/8" and 2"x4 1/4" and in 8 accurate powers — 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50.

Penoptic's manufacturer-to-you distribution policy offers new opportunity to save with safety. For price and full information, write directly to the Pennsylvania Optical Company, Reading, Pa.

By the makers of:
PENOPTIC* WELDING LENSES
SAFETY LENSES
SAFETY GOGGLES

PENNSYLVANIA OPTICAL COMPANY

READING, PENNSYLVANIA

Known for Fine Ophthalmic Products Since 1866

*PENOPTIC is the trade name of Pennsylvania Optical Company

Mid-States Simplified Welding

Cuts Production Costs!

- AUTOMATIC ARC STARTING
- INSTANT AMPERAGE CHANGES
- WELDS FERROUS AND NON-FERROUS METALS
- UNVARYING OUTPUT—NO "CREEPING"
- NO PRESSURE TO CAUSE PINHOLES
- NO MOVING PARTS TO WEAR OUT
- 100% PENETRATION—SMOOTH BEADS

You Can Do a Better, Faster, Easier Welding Job with these
HEAVY DUTY
Mid-States
ARC WELDERS

Other Mid-States Arc Welding Equipment and Accessories

The "BULLDOG"

New Combination Arc Welder and Battery Charger — reconnectable for 110 or 220 volts. An all-around heavy duty portable welder.

For Automatic Arc Starting on All Welders

The "Missing Link" overcomes the necessity of "pecking" or "scratching" to start the arc, even with welders of low open circuit voltage. Any welding rod, A.C. or D.C. can be used.

No. 9000 ARC TORCH

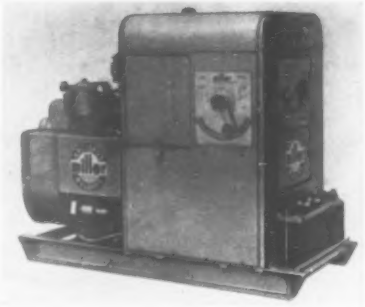
A versatile torch that assures sound welds on all metals—ferrous and non-ferrous. For A.C. or D.C. electric welders. Does brazing, soldering, hard-surfacing, heating, straightening and bending.

• Operators do not need special skill to do a perfect welding job with Mid-States Heavy Duty Welders. You can weld heavy and light gauges, even 22 gauge, without danger of burning through. In addition you can do brazing, soldering, hard-surfacing and heating.

Plug-in type welder transformers are wound throughout with double glass covered magnet wire and stacked with high grade electrical sheet. The Mid-States Heavy Duty Welder is a complete outfit for every welding need.

Write today for complete descriptive literature and the Simplified Welding handbook.

Mid-States WELDER MFG. CO.
6023 SOUTH ASHLAND AVENUE • CHICAGO 36, ILLINOIS



Field Welder

COMPACTNESS and flexibility of operation are claimed by the manufacturer for this new 300-amp d-c field welding and a-c power supply unit. The self-contained power package consists of a three-phase rotating field alternator, which is driven by a 20-hp, two-cylinder air-cooled gasoline engine. The output of the a-c generator can supply 10 kw of standard 60-cycle a-c power for three-phase or single-phase applications.

For welding, the output is passed through a high-capacity selenium rectifier, giving the operator 300 amp of direct welding curent.

MILLER ELECTRIC MFG. CO., Appleton, Wis.

* * *

Welding Fixture

LARGE fabricators as well as small sheet-metal shops should be interested in this new longitudinal welding fixture. It contains numerous individual fingerholds and aligns any metal of almost any thickness and shape.

A rotating mandrel accommodates several copper back-up bars, any one of which can be rotated into position with little effort. Hand welding is possible, as are the automatic processes.

AIRLINE WELDING AND ENGINEERING, 785 N. Prairie Ave., Hawthorne, Calif.

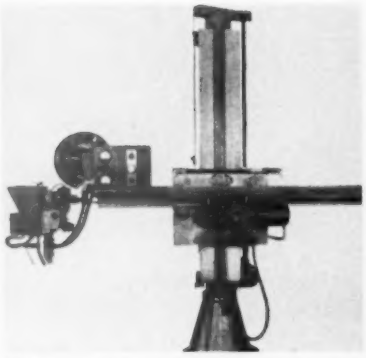
* * *

Ceramic Nozzles

THESE welding nozzles made of ceramic material are said to assure an inert-gas flow that is more directional without any loss of volume and without increasing the arc-clamping characteristics.

For use in manual operations, "Tru-Ohm" nozzles are said to accomplish deep-section welds more easily. Light-alloy adapters, for attaching the nozzle to the welding torch, dissipate heat readily, thus affording torch protection.

TRU-OHM PRODUCTS, Model Engineering and Mfg. Inc., Huntington, Ind.



Fixture

MODEL "CB 6X6" fixture for automatic welding has a tubular lateral ram with an attached automatic head. The ram travels 6 ft 6 in. over the positioned or rotating work. Variable-speed drive provides welding speeds up to 100 ipm. The motorized vertical adjustment ranges from 13 in. to 6 ft. The tubular column, which contains a counterweight, and the ram rotate 360 deg.

The fixture can be mounted on a carriage to travel lengthwise on a special track. Track speed is also variable up to 100 ipm. Welding generators and flux-recovery equipment may be mounted on the carriage. Control of the fixture is centralized in a small hand pendant.

C. B. HERRICK MFG. CORP., 1935 Euclid Ave., Cleveland 15.

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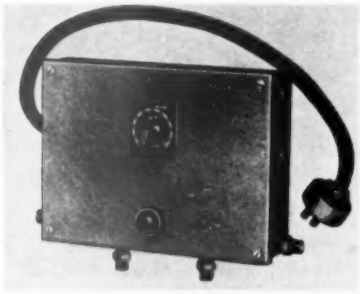


Inert-Gas Control

A NEW automatic control for inert-gas welding saves money by limiting the flow of both gas and water to the necessary welding and cooling periods. The panel works with either a-c or d-c welders and operates on standard 110-volt a-c power.

A safety light signifies that gas and water are flowing. An adjustable electronic timer permits variation of the electrode cooling period from five to 30 seconds, then shuts off both gas and water. The unit measures 10 by 7⅜ by 3⅛ in.

MULLENBACH ELECTRICAL MFG. Co., 2300 E. 27th St., Los Angeles 58.

Why You Should Use...
PAGE Automatic Welding Wire

● PAGE Automatic Welding Wire is made to rigid specifications which provide consistent characteristics for smooth flow of metal during continuous or intermittent welding. There are many analyses for a wide variety of uses.

for INERT GAS Welding

PAGE Stainless Steel Wire is precision thread-wound on 25-lb. non-returnable convenient reels which fit popular arc welding machines. Six Page-Allegheny grades; wire diameters: .035", .045", .0625".

for SUBMERGED ARC Welding

PAGE stainless, low alloy, and carbon steel wire in layer-wound coils, in 22" or 24" mill coils, or on 200-lb. returnable steel reels. Wire diameters from 1/32" to 5/16"; copper coated if desired.

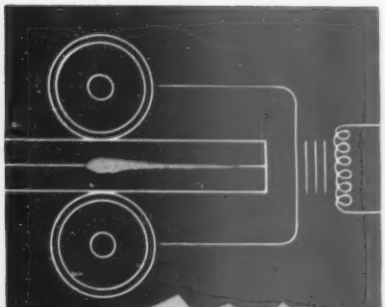
ACCO

Write to our Monessen, Pennsylvania office for Bulletin DH-402

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE Welding Electrodes AND Rods



Up to 150% longer electrode life reported by users

...that's why it pays to use AMPCO WELD* seam-welding wheels

Cut downtime and end costly production losses with Ampco Weld wheels. Laboratory controlled during manufacture, these wheels have outstanding durability and consistently high conductivity.

Ampco Weld hardness and toughness at elevated temperatures provide unusual wear resistance. Many users report up to 150% longer life with Ampco Weld seam-welding wheels.

Ampco Weld wheels are available as rough forgings, finished blanks, or completely machined to drawing, as you wish.

All meet or exceed RWMA specifications. Ampco Metal, Inc. gladly furnishes expert engineering service for specialized applications if you want it. Order Ampco Weld wheels now — and get tough with costs.

*Reg. U. S. Pat. Off., Ampco Metal, Inc. RW-6

AMPCO **Ampco Metal, Inc.**
Milwaukee 46, Wisconsin
West Coast Plant: Burbank, California

It's Production-Wise to Ampco-ize!

Respirator

TWIN cartridges for organic vapors that can be replaced by filters for dust make this a dual-purpose respirator. Its facepiece is contoured of soft rubber, providing a snug, leakproof fit. The cartridges for organic vapors are quickly removed by unscrewing the retainer caps. For dust, the respirator has twin wool-felt filters.

CHICAGO EYE SHIELD CO., 2300 Warren Blvd., Chicago 12.

* * *

Lens-Cleaning Station

BOTTLES and pumps are eliminated in a new lens-cleaning station, which has the cleaning fluid packed under pressure in a can. The fluid contains anti-fogging properties. The can, which contains 1,400 applications, is securely locked to the steel dispenser that feeds interfold wiping sheets individually. The dispenser also contains ample space for waste tissue.

THE SILICONE PAPER CO. OF AMERICA, INC., 230 Park Ave., New York City.

NOW-Make Your Own Oxygen and Nitrogen in One Generator

...and Save Up to 50%!

With INDEPENDENT'S newly-designed generators, you can make your own high-purity oxygen and nitrogen from the free air . . . and in the same generator.

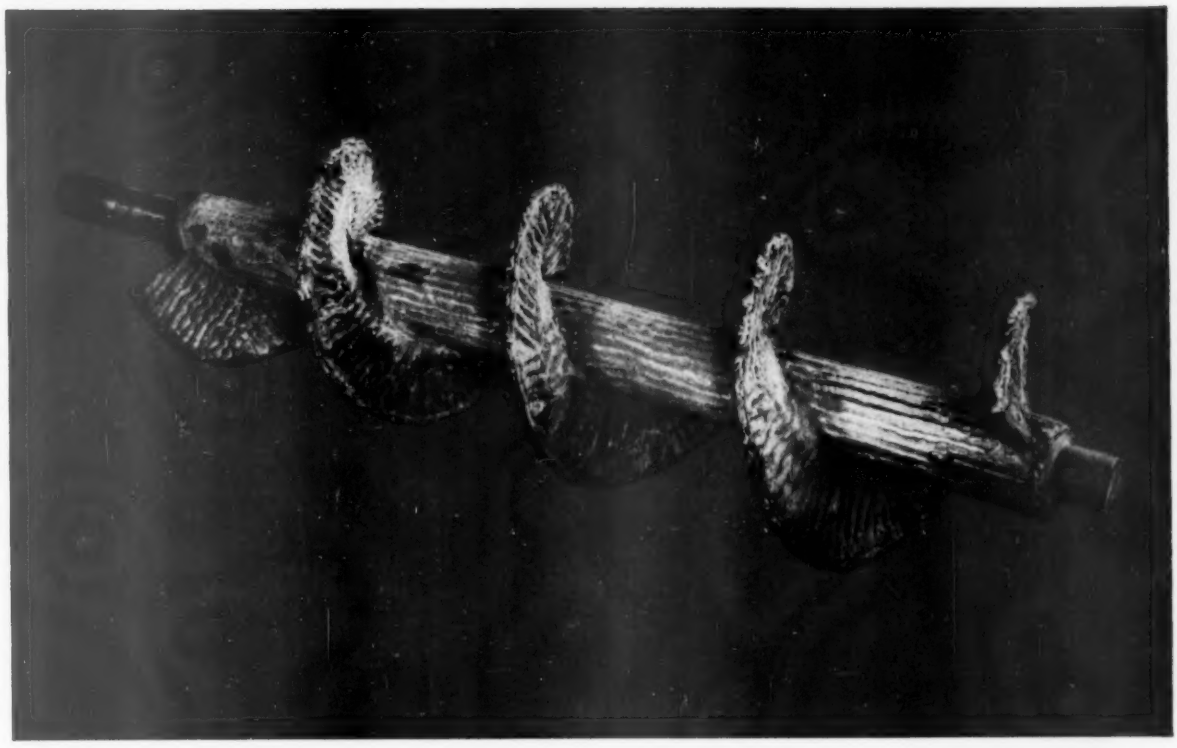
You reduce costs up to 50% by eliminating handling costs . . . vaporizing costs . . . evaporation losses . . . residual losses . . . and transportation costs.

INDEPENDENT Generators are available in any capacity, any purity and any pressure. Put your oxygen-nitrogen problem up to us . . . our engineering department will gladly submit recommendations . . . no obligation, of course!

INDEPENDENT ENG. CO., Inc.

CONSULTING · RESEARCH · DESIGNING

O'FALLON 5, ILLINOIS



Bituminous Asphalt Mixing Screws

STAY ON THE JOB 4 TIMES LONGER

When Hard Faced with COAST METALS Alloy

Hard-Facing With CM-112 Becomes Standard Practice At a Big Eastern Quarry

In a large eastern quarry producing bituminous concrete, screw conveyors employed in mixing trap rock aggregate and asphalt, for surfacing "black top" roads, are subject to such severe wear that uncoated screws cannot "stand the gaff" for more than three or four months without being replaced or virtually rebuilt.

Hard facing with Coast Metals Alloy 112, however, has solved the problem of frequent and highly unprofitable outage.

It is found that if new screws are completely hard faced, they can be made to operate throughout a whole season, provided that screw diameter is built up once or twice by applying a bead of CM-112 on the edge of the screw flight. Since such minor repair can be accomplished *without removal* of screws from the mixing unit, very important savings in time and labor are realized. Hard facing with CM is now standard practice at this plant.

Holding down production and maintenance costs has never been more important than in today's increasingly competitive market. So don't *replace—reface* with CM specialized weld rods. You'll not only minimize outage, but keep your production running on schedule, step up output . . . *save money*. Our representative will be glad to make recommendations on the basis of your specific needs.

COAST METALS, Inc.

Little Ferry, N. J.

COAST METALS (CANADA), LTD., Hamilton, Ontario

PRODUCERS OF HARD FACING WELDING RODS AND WEAR RESISTANT CASTINGS

How to get welds
with **high fatigue strength**

To get the least weight per horsepower in diesel locomotives calls for the light weight and strength of low alloy-high tensile steels. Welded fabrication of this steel demands joints that possess high fatigue strength to resist the pounding and vibration of steady operation.

The rigid quality controls of Arcos Low Hydrogen Electrodes that assure the locomotive builder the needed weld metal physicals, give you the same assurance of consistently high physicals on *any* low alloy-high tensile welding job. *Regardless of the nature or requirements of the job,* when you specify Arcos Low Hydrogen Electrodes you'll get the results you want . . . plus the added saving of time, in many cases, of being able to eliminate preheat and to weld in all positions with one electrode.

ARCOS GRADE	A. W. S. SPEC.
Tensilend 70	E7016
Tensilend 100	E10016
Tensilend 120	E12015
Manganend 1M	E9015
Manganend 2M	E10015
Nickend 2	E8015
Chromend 1M	E8015
Chromend 2M	E9015

ARCOS CORPORATION
1500 S. 50th Street, Philadelphia 43, Penna.

WELD WITH ARCOS
LOW HYDROGEN ELECTRODES

Build-up Rod

"WALMANG" is the name of a new manganese-nickel steel welding rod designed for repairing or building up worn or broken manganese-steel castings. It can also be used as build-up material prior to applying "Colmonoy" hardfacing alloys to manganese-steel parts.

The new rod is said to produce weld metal having the same manganese content, work hardenability and wear resistance as cast 12% manganese steel.

WALL COLMONOY CORP., 19345 John R St., Detroit 3.

* * *

Four-Head Welder

THIS fully automatic, four-head welding machine was designed to weld a complete trailer body. In operation, three separate sheet-steel parts are power conveyed to stop locations. Two operators then load two fenders in place. The parts are all clamped simultaneously. The operators start the welding cycle, and all four heads make their overlapped welds. The heads are electrically interlocked and synchronized to operate without interference. Flux delivery and recovery are fully automatic.

At the end of the weld cycle, all heads move to clearance stations. The parts are then unclamped, and the welded assembly is power conveyed out of the machine while new parts are being inserted.

MORTON MFG. CO., Broadway & Hoyt, Muskegon Heights, Mich.

* * *

Microscope-Reader

A MICROSCOPE-reader of low cost has been introduced for the measuring of diameters of indentations made by the ball indentors of all Brinnell-type hardness-testing machines. It has a magnification of 20X.

This new Brinnell microscope features a system of wires in a flat-field optical system illuminated by a concentrated beam of light. The image of the wire network is superimposed upon the image of the indentation made by the Brinnell hardness tester. The scale is calibrated in millimeters and tenths of millimeters. Total length of the scale is 7 mm, and the diameter of the field of the microscope is 7.5 mm.

The instrument is finished in bright chrome and black oxide. A fabricoid velvet-lined case 2⅛ by 2⅜ by 7¾ in. is provided with each instrument.

PACIFIC TRANSDUCER CORP., 11921 W. Pico Blvd., Los Angeles 64.

Hardfacing Rod

AFTER a short heat treatment, the deposit structure obtained with a new hardfacing rod is said to show wear resistance several times greater than that of conventional bronze welding rods or electrodes. Designed specially as a bearing overlay material, "Frix" is claimed by the manufacturer to be the first bearing alloy that supplants wear properties of phos-bronze and bearing bronzes.

It is described as a mixture of a soft mass with embedded crystals of long-wear resistant copper alloy, combining both impact resistance and hardness. "Frix" permits use of film-like deposit that can be heated to secure maximum performance characteristics.

EUTECTIC WELDING ALLOYS CORP., 172nd St. & Northern Blvd., Flushing, N. Y.

* * *

Aluminum Rod

RESISTANCE to hot cracking is said to be excellent in this new cast aluminum welding rod, designated "No. 356" by the manufacturer. It is to be used particularly where the deposit is to be heat treated after welding to restore original physical properties of the base metal. The rod is said to have a low shrinkage factor, good corrosion resistance, fair machinability and excellent weldability.

ALL-STATE WELDING ALLOYS CO., INC., 249-55 Ferris Ave., White Plains, N. Y.

* * *

Packaging Method

PREFORMED brazing rings neatly fitted on a cardboard tube or dowel rod are offered to speed up production brazing and eliminate waste from bent ends and tangling. This packaging method was devised by Alloy Ring Service, Inc., 1095 E. 52nd St., Indianapolis 5, Ind.

For sound welds in high temperature, high pressure service...

When you have a welding job that calls for weld metal of high strength with excellent properties at elevated temperatures, you can trust ARCOS STAINLESS ELECTRODES to give you the results you want.

Whatever the requirements, Arcos Stainless Electrodes provide a wise investment in time and money. From the extensive line of Arcos electrodes, you can choose the electrode to produce a weld with required physical, chemical, or metallurgical properties to stand up in service. Get your free copy of "What Electrode Would You Use?" Write today!

ARCOS CORPORATION, 1500 South 50th Street Philadelphia 43, Pennsylvania

WELD WITH ARCOS STAINLESS ELECTRODES

Don't let sliding wear rub out your production

use

AMPCO-TRODE* overlays

WANT overlays that have unusually high resistance to wear — that withstand abrasion, shock loads, corrosion? If you do, Ampco-Trode is a natural for you.

Ampco-Trode 160 and other hard grades of Ampco-Trode electrodes, filler rods, and wire are ideal for tough applications where severe sliding wear is a problem and heavy shock loads are present.

The steel-mill manipulator rack shown stands up to the beating it takes because its slides are overlaid with Ampco-Trode 160. Low friction between the Ampco-bronze slides and the hardened steel bed means remarkably high wear-resistance — long dependable life.

And the overlay withstands the high shock loads developed in steel mill work. Result? After more than a year of punishing day-in, day-out operation the slides show *no visible sign of wear.*

Give *your* equipment new life with overlays of Ampco-Trode. Check with your Ampco welding distributor or write us today.

*Reg. U. S. Pat. Off.

W-124

AMPCO®

AMPCO METAL, INC.

Dept. WE-1 • Milwaukee 46, Wis.
West Coast Plant Burbank, California

NEW PRODUCT BRIEFS

Ultrafine-grain industrial X-ray filfim permits detection of tiny flaws in spot welding of aluminum sheets. DU PONT PHOTO PRODUCTS DEPT., Wilmington, Del.

* * *

First-aid supplies of "pharmaceutically controlled quality" are features of a new "Type D" kit. MINE SAFETY APPLIANCE CO., 201 N. Braddock Ave., Pittsburgh 8.

* * *

Five ignitrons have been added to Amperex Electronic Corp.'s line of industrial tubes. The types are electrically and mechanically identical and are interchangeable with standard types of the same designation. AMPEREX ELECTRONIC CORP., 230 Duffy Ave., Hicksville, L. I., N. Y.

* * *

Colorful decals encourage correct and more economical use of "K-Lens-M" anti-fogging liquid. The decal is part of a new attachment for cleaning stations. THE WILKINS CO., INC., Cortland 29, N. Y.

* * *

Chemical single-cartridge respirator "Chemocart C 256" has received approval from U. S. Bureau of Mines for use in low concentrations of organic vapors. PULSOMAN SAFETY EQUIPMENT CORP., 644 Pacific St., Brooklyn 17.

* * *

Air compressors of 15 and 20-hp have been added to this manufacturer's line. These four-cylinder, two-stage compressors are available in 22 different models. THE KELLOG DIVISION, American Brake Shoe Co., 97 Humboldt St., Rochester, N. Y.

* * *

Hose fittings help simplify and speed up installations of hose in crowded locations or difficult applications. Said to make assembling lengths of hose as easy as threading pipe. THE FLEXAUST CO., 100 Park Ave., New York City.

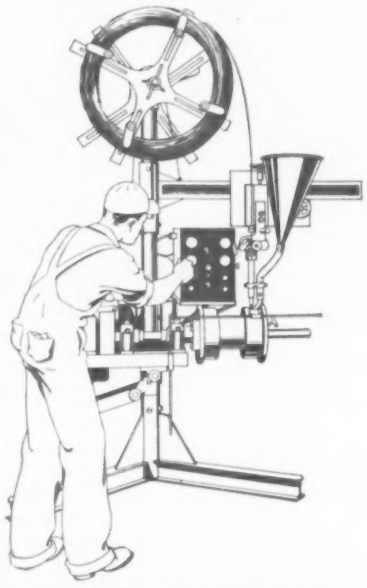
* * *

Weighing only 5 oz, a roomy hood keeps the worker under cover in places where nuisance dusts are present. It may be worn with a respirator. GENERAL SCIENTIFIC EQUIPMENT CO., 2700 W. Huntingdon St., Philadelphia 32.

THIS IS REXARC'S

MODEL RP4

AUTOMATIC WELDER AND POSITIONER



FOR REBUILDING ROLLERS, IDLERS AND FABRICATION WELDING ON ALL CIRCULAR SHAPES

If you do custom welding or operate a fleet of crawler type tractors, shovels or draglines, the Rexarc RP4 is the machine for you!

Here's automatic welding that is really automatic. Rexarc's exclusive electrical design gives you high frequency starting and stabilization of the arc *throughout* the entire welding procedure. This assures fast, uniform deposit of the weld metal, minimizing stress and dilution of the parent metal. Saves time and metal, too.

Operation is simple and controlled from one convenient instrument panel. You can do longitudinal welding, too. Arrangement for automatic step-over, spiral or sequence welding is optional.

See your Welding Supply Distributor or for complete details, write or phone.

THE SIGHT FEED GENERATOR COMPANY

55 EAST THIRD STREET
WEST ALEXANDRIA, OHIO, U.S.A.

No Room for Industrial Complacency

Do you believe that American industry is equipped with remarkably up-to-date and efficient machinery? If you do, you are mistaken. The fact is that a large share of American industry's equipment is ancient, of obsolete design and incapable of attaining the efficiency that is made possible by modern production techniques.

This fact is documented by the Seventh Inventory of Metalworking Equipment, just completed by AMERICAN MACHINIST, a McGraw-Hill publication. In brief, AMERICAN MACHINIST shows that:

1. More than half (56%) of American industry's most basic production equipment—machine tools and metal-forming units—is overage, and much of it is so old that it has very limited usefulness.

2. Since Korea, the situation has become dangerously worse.

Facts vs. Plausible Theory

These conclusions contradict the widely-held impression that America's industrial equipment is in better physical shape than ever before. The prevalence of this impression is not surprising. We, as a nation, have spent about $125 billion for new industrial plant and equipment since World War II. That is more than in any previous period in our history. During 1953, American industry invested $21 billion in new plant and equipment, an all-time high. From this, it would be reasonable to infer that our industrial plant and equipment must be in fine condition.

But the facts do not support that inference with respect to the machine tools and other metalworking equipment that are so crucial to our economy in war and peace. Here are the key findings of the AMERICAN MACHINIST Inventory:

(1) More than one million machine tools—out of a total of less than two million in the metalworking industries—are at least ten years old. Many of these, after day and night operation

during the war years and the recent rush to rearm, are actually much older production-wise than their age in years indicates. In most cases, these machines are unable to produce goods as efficiently as modern equipment can, thus needlessly increasing costs.

(2) Almost one out of five machine tools is more than twenty years old. Most of these machines are so outdated by modern standards that they have little more than scrap value. And an even larger portion of our metal-forming equipment (presses, brakes and shears, bending and straightening machines) has passed the 20-year mark and is beyond normal retirement age.

(3) Two out of three machine tools are of designs predating World War II, though many of them have been built since the war. Thus, two-thirds of our machine tools fail to incorporate the many major postwar improvements in design and operating methods.

(4) Never before has outmoded high-cost equipment been so widely diffused throughout American industry. In every one of fifteen major divisions of metalworking production, more than 45% of the machine tools are at least ten years old.

(5) Not since the depression days of the 1930's has the average age of machine tools risen so rapidly as it has in the past four years. Today, 55% are ten years old or older, compared with 43% just before Korea.

Quality vs. Quantity

Why has the condition of our metalworking equipment been steadily deteriorating since the end of World War II? Part of the explanation lies in the fact that, in the immediate postwar years, production of metalworking equipment lagged behind the production of industrial equipment generally. The larger part of the explanation, however, lies in the tremendous postwar expansion of the American economy. This expansion, which has more than doubled our total industrial capacity, has imposed requirements for metalworking machinery that have been met only by more extensive use of old and obsolete tools. In the critically important field of metalworking, the job of providing up-to-date tools is bigger than it ever has been.

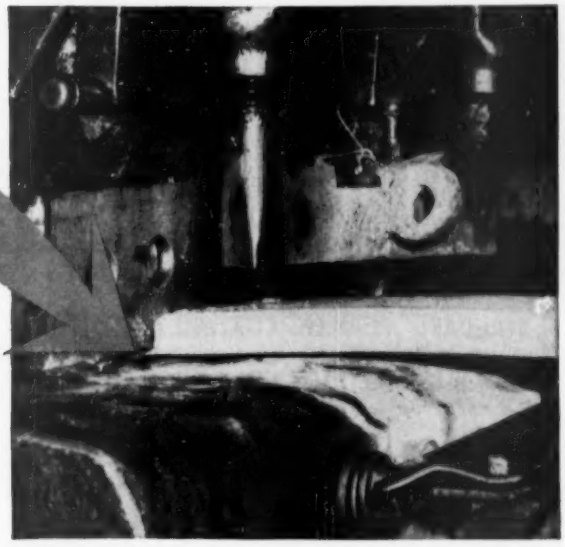
There are those who argue that the time has come to cut back investment in new industrial plant and equipment and divert more of the national income into current consumption. They cite both the great increase in the nation's total industrial capacity since World War II and the fact that some industries now have more than ample producing capacity to meet their needs. But this type of calculation leaves out the *efficiency* of that producing capacity.

The AMERICAN MACHINIST Inventory makes it manifest that in the key field of metalworking we are alarmingly short of first-rate, low-cost producing capacity. If we fail to remedy this situation by speeding the replacement of obsolete tools, it will be at the peril of our prosperity, at the peril of a sustained increase in our standard of living and of our national security.

McGraw-Hill Publishing Company, Inc.

HOT SHEAR BLADES STAY SHARP...when Hard-Faced with HASTELLOY Alloy C
TRADE-MARK

A 3/32-in. deposit of HASTELLOY alloy C on the cutting edge of this shear blade has increased its life by four times. The edge can be rebuilt again and again, when it finally does wear.



This shear blade is used in a plant producing tough non-ferrous alloys. Before hard-facing was adopted, the blades would chip, lose their edge, and have to be scrapped after shearing only about 50 tons of metal. They now can handle roughly four times that amount of metal because they are protected with HASTELLOY alloy C. They can be machined and hard-faced again when they finally do wear. One set of hard-faced blades has been in use in the plant for more than three years with periodic maintenance.

In steel mills, too, HASTELLOY alloy C has increased the life of blooming mill shears by as much as 10 times. Hard-faced blades have lasted 110 turns without maintenance.

HASTELLOY alloy C rod has also been applied to many other hot-working parts with outstanding success. The metal flows well by metallic arc welding or HELIARC welding without preheating. No peening is necessary. Deposits of HASTELLOY C work-harden in service. They can be machined by conventional methods.

For information on how to apply HASTELLOY alloy C to hot-working parts, write for a copy of "HAYNES Hard-Facing Manual." For on-the-job help in applying the rod, get in touch with the nearest District office.

HAYNES *alloys*
TRADE-MARK

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
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"Haynes," "Hastelloy" and "Heliarc" are trade-marks of Union Carbide and Carbon Corporation.

RANITE #4

HIGH ALLOY TYPE HARD SURFACING RODS

DESIGNED TO YIELD THE UTMOST IN WEAR RESISTANT SURFACES!

AVAILABLE IN TWO FORMS:

STANDARD METALLIC COATING FOR ELECTRIC APPLICATION

THIN WASH METALLIC COATING FOR ACETYLENE APPLICATION

RANKIN MANUFACTURING CO.

3072 W. PICO BLVD. • LOS ANGELES 6, CALIF.

TELEPHONE REPUBLIC 3-0972

NEW K-G REGULATORS

Revolutionary! Forged, heat-treated aluminum alloy

Light, compact, rugged—color anodized! Large capacity, constant flow. Accurate pressure control, 4000 lb. HP gauges. Simple, rugged, easy to repair. Many models in both 1100 Series (two stage), 1200 Series (single stage). See your K-G Distributor, or send for NEW FOLDER.

The K-G Equipment Co. (Inc.), Dept. A., 1744 Lehigh St., Allentown, Pa.

K-G 1100 Series (Two Stage)

DISTRIBUTORS! Valuable franchises available. Write for details.

Second Welding Institute at Madison, Jan. 13-15

THE second annual Welding Applications Institute will be conducted by the University of Wisconsin, Jan. 13-15. The conference will be held in the New Engineering Bldg., Randall and Johnson Streets, Madison.

It is the aim of the program to provide latest information on welding designs for structures and machine elements, methods of weld inspection and quality control and general welding practices. The program is slanted toward the small welding establishments as well as the large industrial plants and to welding engineers, design engineers and welding supervisors.

Among the speakers will be T. B. Jefferson, editor of THE WELDING ENGINEER, who will speak on machine design for welding; J. H. Humberstone, first vice-president of the American Welding Society, who will describe what is new in welding; and W. A. Pollack, of Wisconsin Electric Power Co., who will describe welding of high-temperature, pressure and steam piping.

* * *

Government Specifications Made Understandable?

"GOVERNMENT specifications for manufacturing are too complicated." That has been a complaint voiced by many an industry. In an attempt to make specifications more understandable, the Navy's Bureau of Ships has published a guide that it hopes will lessen the complaints. Its author is Margaret Haskin, who writes from 11 years of experience in the purchase specification and standards branch of the Bureau.

First in a series of three articles, the guide answers such questions as: What is the difference between federal and military specifications? How do you identify government specifications? Why are other specifications referenced within a specification?

* * *

Sales-Contest Winners Announced by Eutectic

WINNERS in the nationwide sales contest conducted by Eutectic Welding Alloys Corp., Flushing, N. Y., this past fall were awarded trips to New York City by air, with all expenses paid. The winners: Jean Paul Gagnon, Canadian Division; Malcolm W. Hodkins, Pacific Coast Sales Division; Walter J. Oberlander, Midwest; A. G. Rupp, Central; Robert H. Russell, Western; John P. Strother, Southern; Frank C. Valento, Eastern.

Now . . . 2 New
AO COVERGLAS GOGGLES
Fit Over Safety And Personal Glasses

NEW
Safety Goggles

#326

#327

NEW — 4 WAYS!

1. New Cup Size and Shape
2. New Lens Size and Shape
3. New Side Shields
4. New Easy Lens Replacement

AO's newest development in eye protection—Chippers' and Welders' Coverglas Goggles—can be worn over practically every pair of personal glasses (even the biggest frames) and most types of safety prescription goggles *with and without side shield.*

Wider vision, too, because the lenses are larger and scientifically designed to give up to 20% more vision. Yet, with all these features the goggles weigh but a fraction of an ounce more than ordinary Coverglas goggles . . . cost only slightly more.

These goggles are the newest . . . and two of the greatest . . . developments since the advent of safety goggles. Get all the facts about these two outstanding Coverglas goggles from your AO Safety Products Representative. He can supply you.

QUICK FACTS

- Lens easily replaceable from rear (not front) by means of a spring clamp—no tools needed
- Lightweight, brown plastic cups fit face snugly, won't conduct heat or electricity
- Light-tight side shields for welders (on No. 327 goggle) provide indirect ventilation
- Bridge—High-grade leather. Instant adjustment
- AO worker-lab tests show much greater field of vision and increased comfort
- All-rubber headband, easily adjustable

"326" Chippers' Coverglas goggle supplied with regular Super Armorplate lenses. "327" Welders' Coverglas goggle supplied with regular Noviweld lenses and cover lenses.

AO's Industrial Vision Program Increases Production, Decreases Accidents. Write today for booklet "Improved Industrial Vision" to 1011 Vision Park, Southbridge, Mass.

American Optical Company
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

New **One-Package**

DryRod Electrode Oven

Gives ON-THE-JOB Protection for Low-Hydrogen and Stainless Steel Rods!

NOW YOU CAN HAVE full protection on scattered, isolated jobs for your low hydrogen, stainless steel or other special alloy electrodes . . . with new bantam-size Model 10 DryRod Electrode Oven! Lightweight, Model 10 goes everywhere operator can work . . . holds full 10-lb. package of 14" rods . . . protects against moisture absorption with even, continuous flow of heat. Saves on costly rejects, reworks, scrap loss just like larger DryRod Models—Yet costs less than $50, fully wired, 110-volt AC! Ideal for large, diversified plants and shipyards . . . oil fields and construction jobs . . . installation on mobile service units . . . or as regular unit in smaller shops. See your dealer, or write for full information TODAY!

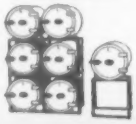
DryRod—Trademark—X-DR-15

Portable Unit Saves 4 Ways Like Other Models:

1 Store sealed cartons in warm, dry place.

3 Locate DryRod as close to welding operations as possible.

2 Place unpackaged electrodes in DryRod Oven and withdraw as needed.



4 For flexible, large-volume storage, stack ovens with compact DryRod Stands.

DryRod DIVISION OF **Phoenix Products Co.**
4715 N. 27TH ST., MILWAUKEE 16, WIS.

Photo Courtesy Peerless Welding Co., St. Louis, Mo.

✓ **THE MECO CIRCLE MIXER**—Correctly proportions welding gases for maximum efficiency and superior results without creating the least resistance to their flow.

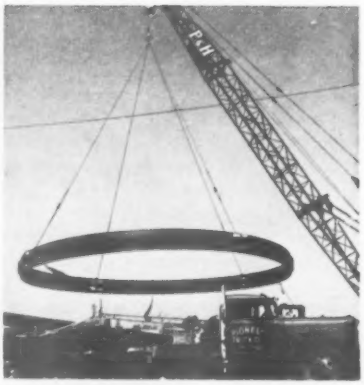
✓ **SPRING TENSION NEEDLE VALVES**—Insure permanent adjustment at any point. Adjustments can be accurately made and held in place regardless of bumping or jarring of welding handle.

✓ **ARMORED GASKET TYPE JOINT**—Provides a leak-proof seal between torch handle and mixing chamber, or torch handle and cutting attachment—minimizes wear.

Meco **FREE—send for New MECO Catalog No. 150 today!**

Modern Engineering CO., Inc.

3411 PINE BLVD. **ST. LOUIS 3, MO.**



Big Welded Ring Taller than a House

WELDING was used in both manufacturing and shipping the largest metal bellows ever built. The bellows, as high as a three-story house, were made by Solar Aircraft Co., San Diego, for a supersonic wind tunnel in Cleveland.

Special forming and welding techniques were used in fabricating the huge stainless-steel joints, which allow the wind tunnel to "give" when under pressure of air or heat.

Unusual precautions were taken in packing the expansion joints for shipping because they were flexible. The larger units had steel braces welded to the end flanges as stiffeners and were placed in crates built of 12-in. square timbers 30 ft long. The crates were then reinforced with ½-in. steel plates held together with bolts.

Too large to ship by rail or truck, the bellows were shipped to Cleveland by a carefully planned water route. They went to New York via the Panama Canal. There they were to be placed on a barge to be towed up the Hudson River, through the New York Steam and Barge Canal to Lake Erie, then to Cleveland. The wind tunnel is operated by the National Advisory Committee for Aeronautics.

* * *

Nelson Stud Welding Story Told to New Orleans Group

THE New Orleans chapter of the Producers Council, composed of local architects, engineers and construction men, heard the story of the rise of Nelson Stud Welding Co., Lorain, O., at a recent meeting. Speakers were Jack S. Godley, vice-president, and George Medsker, architectural consultant, both of the Ohio firm, and Al Lusch, general manager of Reilly-Benton Co., Nelson's representative in New Orleans.

The group also saw the history of Nelson portrayed in a color film entitled "Split-Second Fastening."

- ★ Simplifies cast iron welding
- ★ Preheat and postheat seldom required
- ★ Works on either A. C. or D. C.
- ★ Makes machinable welds
- ★ Stable arc in all positions
- ★ Smooth bead contour
- ★ Excellent "wash"
- ★ Easy slag removal

Ni-Rod

Again Available

Your distributor can now supply your requirements from stock for this high-nickel core wire electrode for welding cast iron.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street **New York 5, N. Y.**

INCO

Ni-Rod's companion electrode, Ni-Rod "55"®, is still preferred for welding:

High Phosphorous iron
Heavy sections
Ductile Iron
Ni-Resist®
High-strength cast irons
Cast iron to other metals

USE COUPON below for free folder on Ni-Rod®.

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.

Please send me the booklet "Ni-Rod, an Electrode for any Cast Iron Welding."

Name_____

Company_____

Address_____

City_____ State_____

W. E. 1-54

ALL-STATE ALLOYS FLUXES

HOW TO DO IT

Condensed Versions of ALL an Operator Needs to Know to Swing to

EASIER WAYS

of Welding, Brazing, Soldering, Tinning, Cutting

FREE!!

Which one do you want?

All State Welding Alloys Co., Inc., White Plains, N. Y.

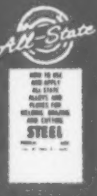
I've checked the "How to Use and Apply" folder I want.

■ DOC ALLOYS KIT — Generous sampler of 11 torch applied ALL-STATE alloys, 8 fluxes, 1 galvanizing powder.

■ ALUMINUM and ALUMINUM ALLOYS — World's most complete line of aluminum alloys and fluxes — ALL-STATE.

■ COPPER and COPPER-BEARING ALLOYS —10 ALL-STATE alloys and fluxes for work on copper and copper-bearing alloys.

■ STEEL—13 ALL-STATE alloys and fluxes for work on STEEL.



Name_____

Address_____

Company_____

Aluminum Industry Urges Stockpile Modifications

REPRESENTATIVES of the aluminum industry recently requested the government to modify aluminum stockpiling specifications. In a meeting with officials of the Business and Defense Services Administration and the Office of Defense Mobilization, some industry spokesmen said they cannot meet stockpile requirements for specified grades and at the same time fill commercial orders from the available supply.

It was suggested that the government purchase as much of the lower grades of aluminum as stockpiling needs will permit, at least until new facilities are able to produce enough high-quality aluminum to meet stockpile obligations. Eventually, 18 plants will be producing primary aluminum, and their output would be sufficient to meet all needs. But the industry needs more time.

Meanwhile, the BDSA announced that 194,000,000 lb of aluminum will be reserved from the total supply available in the first quarter of this year to fill the needs of the Department of Defense and the Atomic Energy Commission. This is 41,000,000 lb less than the amount set aside for similar orders in the last quarter of 1953. The reduction from 29% to 24% of the supply reflects a decrease in military requirements, BDSA officials said.

There is no restriction on civilian consumption of aluminum after defense, atomic energy and national stockpile needs are met.

* * *

Record Attendance at NWSA Meetings

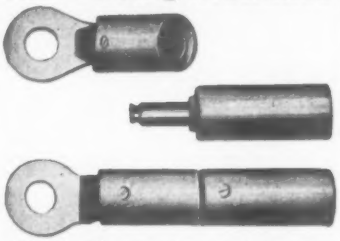
C. E. DENNIS, sales manager for Sellstrom Mfg. Co., Chicago, was the only person to attend all six zone meetings of the National Welding Supply Association last year. (Actually, he has not missed a meeting since he started attending in 1949.) Arthur D'Espies, of Welding Alloy Mfg. Co., Newark, had the second-best attendance record, having missed only one meeting.

* * *

New Paving Technique Includes Welded Wire

BITUMINOUS resurfacing over welded wire fabric—a new paving technique—was depicted in a color film shown to state highway officials at a recent meeting in Pittsburgh. The Wire Reinforcement Institute showed the movie, which portrayed the recent resurfacing of a portion of U. S. 61 in Minnesota.

TWECO TERMINAL CONNECTORS for Welding Machines



Bolt directly to positive and negative welder studs. Provide easy cable switch to reverse polarity. Simple cable disconnect for quick "Jump-In" of additional cable.

3 Sizes for cables: #6 through 4/0

The male plug of TWECO "Sol-Con" and "Mec-Con" Cable Connectors connect with TWECO Terminal connectors: Sol-Con and Mec-Con Cable Connectors are COMPANION ITEMS.

Write for Twecolog #9 giving data and prices on the complete TWECO line of electrode holders, ground clamps and cable connections for electric welding.

See Your Welding Supply Distributor

Tweco PRODUCTS COMPANY

Boston at Mosley WICHITA, KANSAS

TWECO PRODUCTS

WELDERS' CLAMPS

HARGRAVE Tested Tools THE CINCINNATI TOOL COMPANY

Each Tool Is Individually Power - Tested

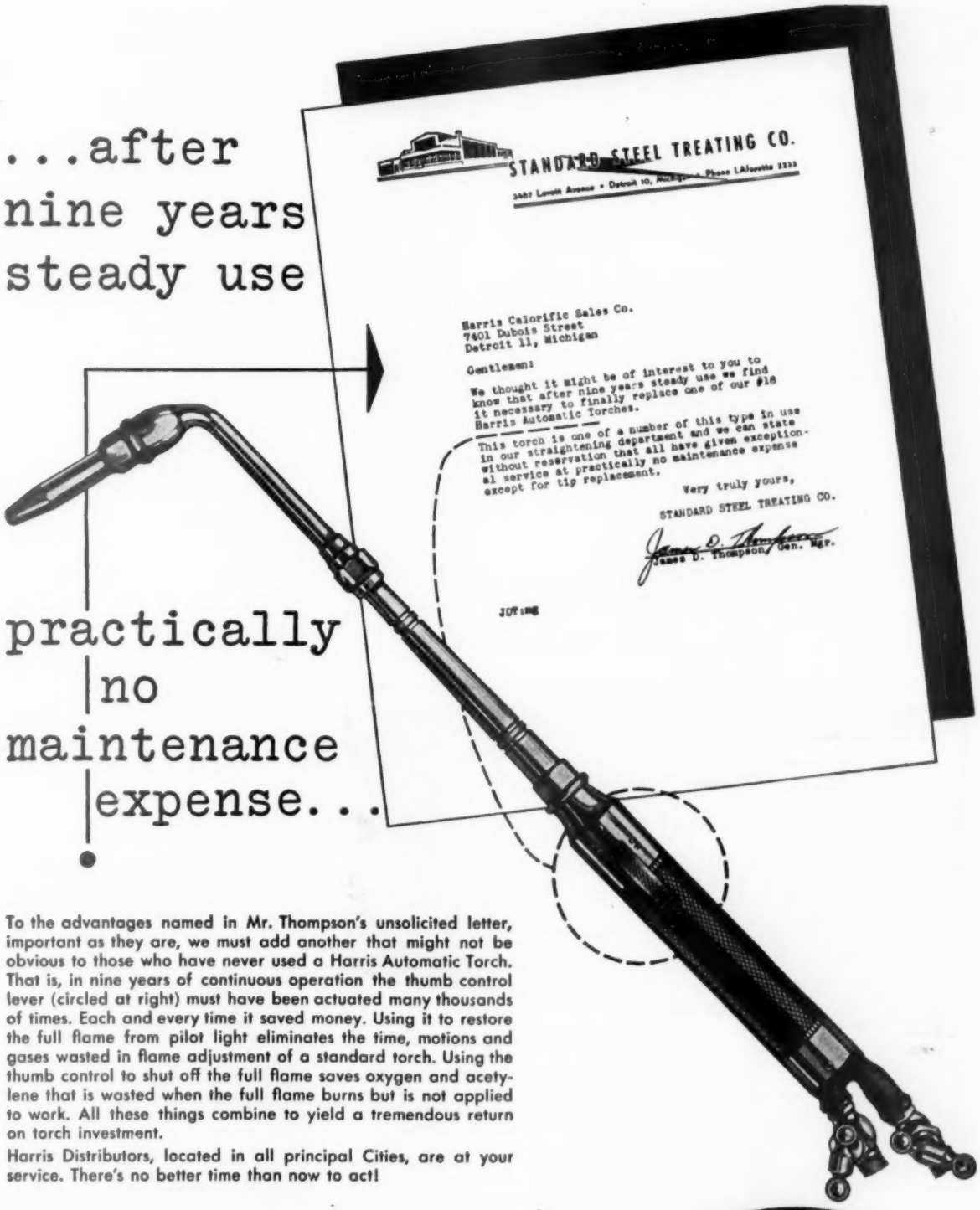
Ask for CATALOG showing the most complete line of CLAMPS. Stock sizes from ¾" to 12' opening ½" to 16" deep.

THE CINCINNATI TOOL CO.

1944 Waverly Ave., Cincinnati 12, Ohio

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

...after
nine years
steady use


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #1a Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

practically
no
maintenance
expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

If you use torch brazing in production

GASFLUX BRAZING PROCESS will save you big money

GASFLUX eliminates dipping, brushing, spillage and waste of flux.

GASFLUX makes stronger, tighter joints with less brazing alloy.

GASFLUX eliminates cleaning operations because it leaves the braze clean—no residue.

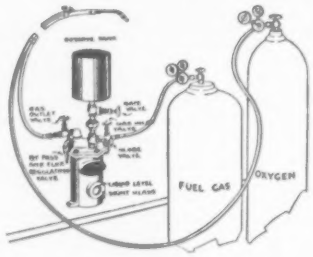
GASFLUX prevents formation of black oxide scale.

GASFLUX assures better penetration of brazing alloy.

GASFLUX eliminates porosity in brazed joints, saves high cost of rejects.

GASFLUX improves production rates up to 25%.

GASFLUX works equally well with copper-base and silver-base brazing alloys.

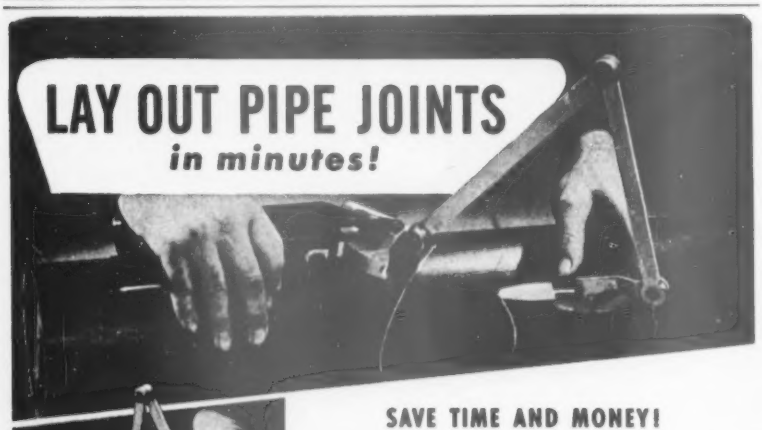


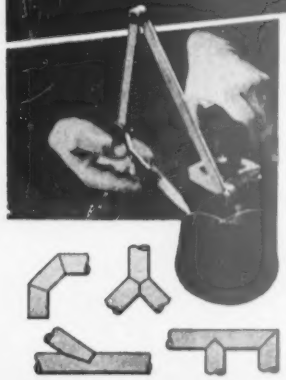
A GASFLUXER can be installed in your production line in less than 2 minutes, without disturbing only standard set-up. Works equally well with acetylene, city gas or other fuel gas. Uses standard torches and tips.

The GASFLUX Brazing Process is now making all of these savings on production work. On request we shall be glad to send details. Write today.

The Gasflux *Company*

198 Wayne Street Mansfield, Ohio





SAVE TIME AND MONEY!

A SMOOTH SWING of the Contour Marker's soapstone point and you're ready to cut! It's easy and *absolutely accurate* because there is an angle dial calibrated in both degrees and pitch. Any of the pipe joint angles shown can be marked off in minutes. And you save "man hours" as well as oxygen and acetylene gas because "cut and try" methods are completely eliminated. Two sizes are available-complete with adapter for marking structural steel. Standard, for pipes from 1½" to 18" dia.; Jumbo, for pipes from 16" to 48" dia. Instruction book included. Belt case available. Write for information

CONTOUR MARKER CORPORATION OF CALIFORNIA
1843 E. Compton Blvd., Compton, California • NEwmark 1-9474

THE CONTOUR MARKER

Selenium Rectifiers Make Headlines

MANUFACTURERS of selenium rectifiers have strongly disputed the claim, made in several articles during the past year, that these rectifiers are toxic. A recent article in the Bureau of Ships *Journal* upholds the manufacturer's position. The article reviewed the question and made recommendations concerning Navy policy.

Although investigations by the Bureau are continuing, the Navy will keep using selenium rectifiers where called for.

The *Journal* stated that during the past 15 years of their general use the rectifiers have given evidence that there is little or no danger of selenium poisoning because of rectifier failure.

* * *

Federal Machine & Welder Co. Toured by Group from GM

An inspection tour of the facilities and operations of The Federal Machine and Welder Co., Warren, O., was recently made by representatives of three General Motors technical subcommittees. The tour was held in conjunction with a meeting of GM's master mechanics welding equipment, metallurgical joining processes and plant engineers electrical standards subcommittees. The Warren firm manufactures electric spot, projection, flash, seam and portable gun-type resistance welders.

* * *

SAVES WATER

Courtesy General Electric Co.

TEMPERATURE-control feature of new ignitron tube can save up to 95% of cooling-water needs for the tube. It also protects tube from overheating in event of water supply failure. Here workman is making final adjustments on a thermostatic unit.

Oxygen Manufacturers Elect 1954 Officers

OFFICERS and directors of the Independent Oxygen Manufacturers' Association for 1954 were elected at the annual fall meeting in Houston. Chosen were: Harold Macauley, Wolverine Gas Products, Inc., Saginaw, Mich., president; Al Herzstein, Houston Oxygen Co., Houston, vice-president; J. F. Wagner, The Burdett Oxygen Co., Cleveland, secretary; R. L. Swope, Southern Oxygen Co., Washington, D. C., treasurer.

Named to the executive council were: Marvin White, Welding Gas Products Co., Chattanooga; Tom Kean, Sierra Oxygen Co., Reno, Nev.; G. Morgan McBride, Western Oxygen, Inc., Seattle; Fred Tillman, Compania Mexicana AGA, S. A., Mexico, D. F.; R. G. Harrison, Welders Supply Co., Little Rock.

* * *

Civil Service Gives Exams for Welding Engineers

EXAMINATIONS for specialized engineering positions were recently announced by the U. S. Civil Service Commission. Needed are welding, marine and aeronautical engineers and naval architects. The jobs pay from $3,410 to $10,800 per year and are located in the Navy Dept. and in other federal agencies in Washington, D. C., and vicinity.

No closing date for the exams has been announced, and applications will be accepted until further notice. Announcement No. 386, which concerns these positions, and application forms may be obtained by writing: U. S. Civil Service Commission, Washington 25, D. C.

* * *

Distributor Appointments

Air Reduction Sales Co., New York City: Service Auto Parts, Ellijay, Ga., and Copperhill, Tenn.

Ampco Metal, Inc., Milwaukee: Production Materials Co., St. Paul; Guilford Welding Supply Co., Baltimore; General Distributing Co., Inc., Great Falls, Mont.; Zane Weldcraft Supplies, Hartford, Conn.; Kirk-Wiklund & Co., Kansas City, Mo.

Arcos Corp., Philadelphia: Service Supply, Inc., Oklahoma City.

Carboloy Dept., General Electric Co., Detroit: Mahar Tool Supply Co., Inc., Saginaw, Mich.

Nelson Stud Welding Division, Gregory Industries, Inc., Lorain, O.: General Engineering and Machinery Co., Tampa, Fla.

Reid-Avery Co., Baltimore: The Interstate Welding Supply Corp., Cambridge, Mass.

The finest . . . the most complete rectifier type D.C. welders that incorporate these features you asked for:

- The widest possible current range for extreme versatility!
- Pulsating D.C. current for maximum electrode deposition rate!
- Easy to operate current range selector switch!
- Simple polarity reversal switch!
- Extreme arc flexibility that pleases all operators!
- High electrical efficiency for most economical operation!
- Fully guaranteed, time tested rectifier stacks — designed especially for welding applications!

Available in 4 models with welding current ranges—SR200, 3-300; SR300, 3-425; SR400, 5-550 — and for the heaviest industrial applications SR600, 15-750 amperes.

When you buy MILLER rectifier welders you may be sure they are the latest of their type — way ahead of others in modern improvements. See your MILLER distributor for complete details . . . or write

MILLER ELECTRIC MANUFACTURING CO.
APPLETON • WISCONSIN

When it's... miller ...you know there's none better!

Tempilstik°

the amazing Crayons that tell temperatures

A simple method of controlling working temperatures in:

- WELDING
- FLAME-CUTTING
- TEMPERING
- FORGING
- CASTING
- MOLDING
- DRAWING
- STRAIGHTENING
- HEAT-TREATING IN GENERAL

It's this simple. Select the Tempilstik° for the working temperature you want. Mark your workpiece with it. When the Tempilstik° mark melts, the specified temperature has been reached.

$2 each

gives up to 2000 readings

Available in these temperatures (°F)

113	263	400	950	1500
125	275	450	1000	1550
138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
250	388	900	1450	2000

Also available in pellet or liquid form.

FREE —*Tempil° "Basic Guide to Ferrous Metallurgy"* — 16¼" by 21" plastic-laminated wall chart in color. Send for sample pellets, stating temperature of interest to you.

Tempil° corp.
11 WEST 25th STREET
New York 10, N. Y.

THOMAS D. NAST was recently elevated to the presidency of All-State Welding Alloys Co., Inc., White Plains, N. Y. He had been a director and secretary-treasurer of the company since it was founded in 1946. Mr. Nast succeeds BENT LAUNE, who resigned.

* * *

PAUL GALTON has been appointed manager of the welding and positioning equipment sales division of Worthington Corp., Harrison, N. J. Prior to joining Worthington, he was sales manager for Central Transformer Corp., Pine Bluff, Ark., where he was responsible for the sale and distribution of welding machines and power transformers. His previous positions were assistant sales manager for a large eastern distributor of welding equipment and assistant sales manager of Larkin Lectro Products, manufacturer of arc and resistance welding machines.

* * *

ALBERT W. BULLWINKEL has been appointed vice-president in charge of production for the Silicone Paper Co. of America, Inc., manufacturer of safety lens tissue and equipment. He was formerly with Westinghouse Electric Corp.

* * *

CHARLES W. PUNTON has been appointed director of engineering for Mine Safety Appliances Co., Pittsburgh. He has been with the company since 1929, when he started as an industrial engineer. He was named works manager in 1941.

* * *

WILLIAM F. RUEHL has been named sales representative for the eastern part of the country by Miller Electric Mfg. Co., Appleton, Wis. A native of Baltimore, he has been in the welding industry since leaving high school.

The Champ of Clamps!

THE GRAND QUIKCET DUAL GRIP TYPE 'AS"

Quick setting double-action clamp grips work more securely. Holds irregular and off-parallel surfaces as well as flat work due to pincer action. Easily tightened in cramped areas.

4 SIZES: 2½" TO 6" OPENING
SPATTER-PROOFED—NACO NO. 6 STEEL
(80,000 LBS. TENSILE)

Famous GRAND "C" Clamps

Alloy Steel (Stronger than forged) Spatter-Proofed Screws, Deep Throat—Replaceable Swivels

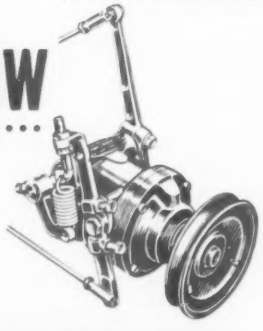
LIGHT SERVICE SERIES	MEDIUM SERVICE SERIES	HEAVY SERVICE SERIES
L SERIES	ASM SERIES	ASH SERIES
8 SIZES 2" TO 12"	7 SIZES 4" TO 18"	6 SIZES ¾" TO 12½"

NCG

STOCKED and DISTRIBUTED BY NATIONAL CYLINDER GAS COMPANY

OFFICES IN PRINCIPAL CITIES

NOW



PIERCE

LONG RANGE

UNIVERSAL GOVERNOR

fits 9 out of 10 industrial gasoline engines . . . ideal for engine-driven welders.

gives accurate "variable speed" or "constant speed" engine control between 1200 and 2600 RPM.

See your welding supplies dealer or write to:

(DEALERSHIPS AVAILABLE)

THE PIERCE GOVERNOR CO., INC.
1618 Ohio Ave., Box 1000, Anderson, Indiana
World's Most Experienced Governor Manufacturer

A. L. FOSCUE has been appointed president of Electro Metallurgical Co. and United States Vanadium Co., divisions of Union Carbide and Carbon Corp. He succeeds WALTER E. REMMERS, who became chairman of both divisions. Mr. Remmers is also a vice-president of the corporation.

* * *

A. R. SCHNELLER has been appointed manager of welding sales for the Pacific Coast region by the Welding Products Division of A. O. Smith Corp. He was formerly responsible for welding sales in Wisconsin. Mr. Schneller last year won the "Oscar" of the Sales Executive Club of Chicago.

* * *

Tube Turns, Inc., Louisville, Ky., recently announced the following personnel changes in its sales staff: EARL R. MUIR, JR., formerly of the San Francisco office, has been assigned to Seattle. His office is at 203 White Building. BERT GRANT and CLYDE CHRONISTER have been appointed sales-engineering representatives. Mr. Grant has been assigned to the Pittsburgh office, Mr. Chronister to the Tulsa office. RICHARD T. BURKE, a sales engineer, has been added to the Houston staff.

* * *

JAMES S. ANDERSON has been appointed general sales manager of the Tubular Products Division of The Babcock & Wilcox Co. He has been with the firm since September, 1941. His headquarters will be at Beaver Falls, Pa., where he will direct the sales of the division's carbon, alloy and stainless steel products.

* * *

MARTIN M. SMITH has joined the sales force of the New York Welding Supply Co., Inc., New York City. He recently retired as sales manager of Air Reduction Sales Co., after 15 years of service.

* * *

DR. JAMES L. THOMAS has been appointed chief of the newly organized resistance and reactance section of the National Bureau of Standards' electricity division. With the Bureau since 1927, he holds several patents on resistance alloys. He formerly was chief of the resistance measurement section.

EASY-FLO AND SIL-FOS
LOW-TEMPERATURE
SILVER ALLOY BRAZING

...the Modern Designer's key to fast, low-cost metal joining

This is the process that opens the door to amazing speed, reliability and economy in the production of metal assemblies.

It's the process that...

1. assures exceptional joint strength plus the ductility to withstand any stresses and strains the joined metals will take.
2. naturally and consistently makes joints that are liquid and gas-tight – also high in electrical conductivity, heat transfer and resistance to corrosion.
3. joins thin metals without danger from overheating.
4. makes possible fast, fool-proof metal joining with unskilled labor.
5. brings metal joining costs down to surprisingly low figures.

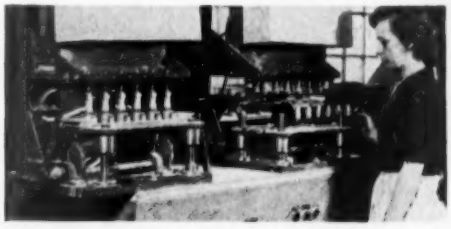
It's the process that deserves first consideration in the *design stage* because that's where your product's quality and cost of production are determined.

LET OUR FIELD ENGINEER HELP

He will place at your service the maximum technical knowledge about silver alloy brazing and practical experience in its application available today. He'll call entirely without obligation. Just write and say when.

FOR THE FACTS IN PRINT

Bulletin 20 gives the complete EASY-FLO and SIL-FOS story plus a lot of valuable information about joint design and fast production brazing methods. Write for a copy.



TYPIFYING the fast, low-cost EASY-FLO and SIL-FOS production formula is this brass sleeve and stamped steel lock case assembly. Parts are positioned in jigs with the alloy *preplaced* — then induction brazed 6 at a time in 31 seconds. Unskilled labor does it all.

NOT LIMITED TO NEW DESIGNS

Numerous parts joined by other methods have been redesigned for EASY-FLO and SIL-FOS brazing's faster production and lower costs. Likewise, many cast and forged parts have been changed to EASY-FLO and SIL-FOS brazed assemblies of stampings and simple screw machine pieces.

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

OFFICES and PLANTS
BRIDGEPORT, CONN.
PROVIDENCE, R. I.
CHICAGO, ILL.
CLEVELAND, OHIO
DETROIT, MICH.
LOS ANGELES, CAL.
TORONTO, CANADA
MONTREAL, CANADA

Keep safety standards **HIGH**
. . . operating costs **LOW**
with **ATLANTIC**
Speed-Tested **WHEELS**

Make sure that your snagging operation is set up for maximum productivity, lower costs and complete on-the-job safety by specifying Atlantic Speed-Tested Grinding Wheels the next time you order.

You'll find that every Atlantic Wheel made—from the 2 inch size on up—is test run at a 50% higher speed than that required for normal snagging conditions . . . that every wheel features a special Resinoid Bond for extra safety and longer wear under high operating speeds . . . that their smooth, floating action requires less pressure, makes work easy. You'll find, too, that because they seldom have to be dressed, Atlantic Wheels eliminate downtime . . . keep costs at a minimum. They cut cleaner, faster . . . run cooler. Try them and see.

Send for the complete, fact-packed Atlantic Grinding Wheel Catalog now and check these important snagging advantages. Atlantic Abrasive Corp., 545 Pearl St., So. Braintree, Mass.

ATLANTIC ABRASIVE CORP.
South Braintree 85, Massachusetts

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

For Welding and Cutting . . .
NATIONAL CARBIDE
in the red drum
HIGHEST QUALITY
DUST FREE

Write for the name and address of the NATIONAL CARBIDE supplier nearest you.

National Carbide Company
GENERAL OFFICES: 60 EAST 42ND STREET, NEW YORK 17, N. Y.
A DIVISION OF AIR REDUCTION COMPANY, INCORPORATED

JOSEPH P. STANAVAGE has joined the research and development division of Pennsylvania Salt Mfg. Co. He will work on projects of the corrosion engineering products department. He was formerly with the general chemical division of Allied Chemical & Dye Corp.

* * *

HENRY L. POHNDORF has been named sales manager of National Welding Equipment Co., San Francisco. A graduate of MIT, he has been chief engineer since joining the firm seven years ago and will continue in that capacity while also serving as sales manager. Mr. Pohndorf has been in the welding industry for more than 12 years.

* * *

PAUL FULMER has joined Wiese Plow Welding Co., Perry, Iowa, as a field representative and demonstrator for distributor personnel. He will also assist in conducting training classes at the plant.

* * *

The following shifts in its sales personnel were recently announced by Fansteel Metallurgical Corp.: RICHARD I. ALLEN, formerly district manager of the Detroit-Cleveland-Pittsburgh region, has been named sales manager of Fansteel's Weiger & Weed Co. division, with headquarters at Detroit. FLOYD CESSNA, formerly of the Detroit office, succeeds Mr. Allen, moving to Cleveland. WALTER E. BULLOCK, formerly eastern district manager, has been named field sales manager and will have his headquarters at the main office in North Chicago. GEORGE C. GORMAN succeeds Mr. Bullock in New York.

* * *

G. A. T. WASHBURN has been appointed special assistant to the president of Turco Products, Inc., Los Angeles, manufacturer of chemical cleaning and processing compounds. Formerly a rear admiral in the Navy, he will be in charge of facilities.

* * *

ROBERT E. HALLORAN has been appointed to the new position of manager of mechanical sales for Tubular Products Division of The Babcock & Wilcox Co. GEORGE G. ZIPF has been appointed superintendent of the division's steel plant.

KENNETH L. WALKER has been appointed superintendent of the new Mountaintop, Pa., plant of Foster Wheeler Corp. He formerly was superintendent of the boiler shop at the Carteret plant, where he joined the corporation in 1934, specializing in welding and fabrication. A member of the American Welding Society, Mr. Walker was chairman of the New Jersey section in 1945-46 and again in 1949-50.

* * *

ROY W. GREEN has joined the sales staff of The Pierce Governor Co., Inc., Anderson, Ind. He formerly was with the Hoof Governor Co., Chicago.

* * *

CARMINE J. VENUTO recently joined Foote Mineral Co.'s research and development department as a mineralogist.

* * *

JOHN R. HAMILL has been appointed manager of the Kansas City district office of Worthington Corp., Harrison, N. J.

* * *

CHARLES M. RUPRECHT has been named president of American Brake Shoe Co.'s Electro-Alloys Division. He was formerly vice-president of the division, which is located in Elyria, O.

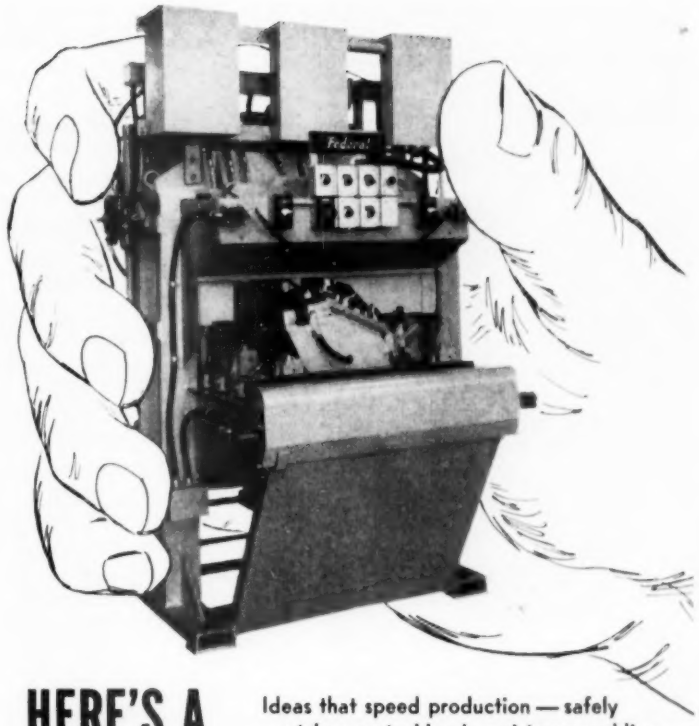
* * *

Died . . .

ROBERT MALCOM, SR., chairman of the board of Chicago Eye Shield Co., died Nov. 27 at his home in Elmwood Park, Ill., at the age of 82. A native of Chicago, he founded "Cesco" in May, 1903, in that city. The first product of the company was celluloid goggles, which were popular in those days of the open automobile. Despite his age, Mr. Malcom was active in the business up until two days before his death. He has been succeeded by his son, Robert, Jr., who became president and chief development engineer in 1948.

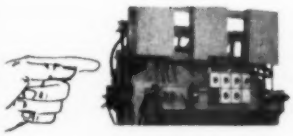
* * *

W. EARLE SHUMWAY, manager of sales engineering at Norton Co., Worcester, Mass., died Oct. 25. He had been with the company since 1917, when he started in the research laboratories. He was a veteran of World War I. Mr. Shumway is survived by his widow, a son, a daughter and four grandchildren.



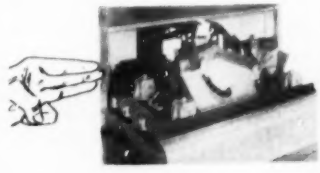
HERE'S A WELDERFULL OF IDEAS

Ideas that speed production — safely —at less cost. Here's resistance welding machine design at its finest. Compact — readily installed — accessible for maintenance — safe and easy to operate — fully automatic. Just a few of the features that make Federal machines first in resistance welding.



All electrical connections readily accessible and compactly arranged in their enclosures for transformer primary leads, electrical accessories terminal board and a "quick disconnect" terminal board for the main control panel. Centralized control station with safety spaced dual start buttons. Emergency cord for instant stopping of machine.

Flash guard moves down to seal off weld area protecting operator and machine. Flexible curtain unrolls with fixture travel to shield slide ways. Body bumper emergency stop. Leg area shield protection.



Booted gun piston rods hardened and ground and equipped with scrapers to avoid weld flash pick-up. Capped electrodes. Guided piston rods for offset loads. Double acting hydraulic gun cylinders. Air and water hose to fixture kept clear of work area.

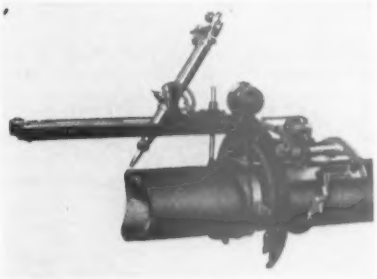
Federal® WELDERS

Warco® PRESSES

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

If tedious hand-cutting and fitting is chewing up the profits in your pipe fabrication jobs, put a stop to it right now! Your time can be accurately estimated and more profit dollars assured by letting the H & M Shape-Cutter whip out your most difficult contour cutting problems in a matter of minutes. With the H & M here's all you do: Quickly attach the right pattern to your H & M Cutter and Beveler; lift the split horseshoe-shaped gear over the pipe; snap the spring-tension chain



fastener which locks the H & M securely in place; light the torch, adjust the flame and give the crank a few turns — THAT'S ALL, the job is done and you have a perfect, accurate cut, less reject welds assured. For more detailed information —

WRITE FOR THE FREE FOLDER
"MORE PROFIT DOLLARS IN PIPE FABRICATION"

H&M PIPE BEVELING MACHINE CO.

Trade Mark Reg. U.S. Pat. Off.

311 E. 3rd. St. • Ph. 3-0241 • Tulsa, Ok.

30 YEARS AGO

(Taken from THE WELDING ENGINEER *of January, 1924)*

ARC welding copper to steel is described in this issue by Chester F. Gailor. Mr. Gailor's paper was presented before the American Welding Society at that group's meeting last month in New York City.

—30 YEARS AGO—

CONSTRUCTION of a new $100,000 plant for the manufacture of liquid oxygen was announced by the Burdett Oxygen Co., Chattanooga, Tenn. The new plant, located in Knoxville, is expected to be completed by June 1.

—30 YEARS AGO—

THE California Compressed Gas Co., Oakland, has secured a contract for supplying gas to be used in cutting into scrap the battleships Rhode Island and Georgia. Newspaper reports estimated the gas required at 10,000,000 cu ft.

—30 YEARS AGO—

PROGRESS made in pipeline welding during the past year was reviewed in an article by N. E. Wagner, welding superintendent, Prairie Pipe Line Co. The article was based on a paper Mr. Wagner presented before the International Acetylene Association in November.

—30 YEARS AGO—

THE Memphis Oxygen Co., Memphis, Tenn., is erecting a new air liquefaction oxygen plant. Capacity will be 700,000 cu ft per month. The building, expected to be finished by March 1, will cost about $50,000.

—30 YEARS AGO—

ELECTED as active members of the Gas Products Association earlier this month were the following firms: Gas Products Co., Columbus, O.; International Oxygen Co., Newark, N. J.; International Oxygen Co., Toledo, O.; International Oxygen Co., Verona, Pa.; Southern Oxygen Co., So. Washington, Va.

—30 YEARS AGO—

C. W. ROBERTS, welding supervisor of the Pennsylvania Railroad at Columbus, O., presented a paper entitled "Getting Results Economically by Electric Arc Welding" at the January meeting of the American Welding Society, Chicago Section. A second paper, "Production of Oxygen by Air Liquefaction Process," was read by D. B. McCloud, of M. Keith Dunham, Chicago.

WAGNER
ELECTRODE HOLDERS

mean

— Engineering at its Best!

— Dependability, Economy, Safety!

- "STREAMLINE" — Low center of gravity trigger for quick one-hand rod release — saving time in production WELDING.
- HIGH HEAT RESISTANCE — Glass fiber insulation for Jaw covers give greater strength with longer life.
- WAGNERLOY — High Arc Resistant copper alloy used in tong members.
- CHANNEL CONSTRUCTION — In tong members for more rapid heat dissipation.
- SPRING TENSION ADJUSTMENT — for proper rod grip and ease of spring replacement.

WAGNER MFG. CO.
350 W. 1st SOUTH ST.
JACKSON, MISSOURI

Weld with Wagner

A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet."

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McGraw-Hill Publishing Company, Room 2710, 330 West 42nd St., New York 36, N. Y.

Letters should be addressed to: The Editor, THE WELDING ENGINEER, 520 N. Michigan Ave., Chicago 11, Ill. No letter will be published unless signed, but your name will be withheld if you request it.

Liked November Editorial

Dear Sir:

I congratulate you on your editorial "Give Thanks for Our Discontent," which appeared in the November issue of THE WELDING ENGINEER. In my opinion, it is true, it is timely, and it is well expressed.

Sincerely,
H. C. Boardman
Chicago Bridge & Iron Co.
Chicago

* * *

Permission Granted

Dear Sir:

We would like to secure your permission to reprint the editorial entitled "Another Black Eye," which appeared on page 43 of the October issue of THE WELDING ENGINEER. These reprints are for distribution to our employees and will be used in connection with our plant safety program.

Proper credit, of course, will be given to both author and THE WELDING ENGINEER.

Yours very truly,
H. V. Barr
Division Manager
W. J. Abel
Personnel Supervisor
The Ohio Power Co.
Brilliant, O.

* * *

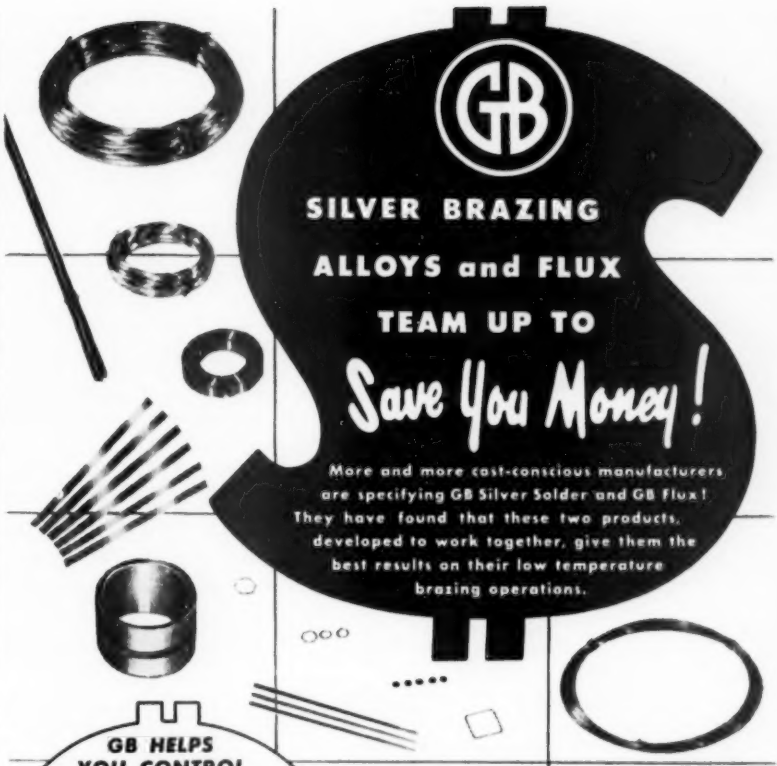
Pictures Were Sent

Dear Sir:

On pages 32 and 33 of the November issue you had some pictures of a Russian-built MiG-15. Would it be possible for you to furnish us with prints of these pictures?

Thank you very much for your cooperation.

Very truly yours,
Charles A. Brown, III
Librarian
The Minneapolis Star
and Minneapolis Tribune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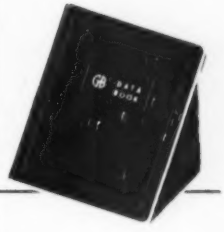

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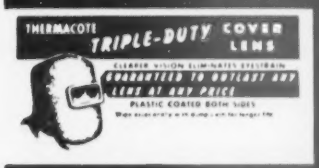

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You're Right

Dear Sir:

I was greatly amazed by this statement in "Russian Welds—Good and Bad," which appeared in the November issue of THE WELDING ENGINEER:

"It has recently come to the attention of our military that in the land of the hammer and sickle they are successfully resistance welding three different thicknesses of metal simultaneously. That is something we haven't been able to do very well on this side of the Atlantic."

If you would investigate on this side of the Atlantic, you would find that we are very successful with multiple-thickness welding.

I don't know to what metal you had reference, but we resistance weld three thicknesses in magnesium, mild steel and low-alloy steels; and three and four thicknesses in aluminum and stainless steels—all on structural aircraft components and to present military specifications.

Very truly yours,
Robert Welch
Welding Engineer
Goodyear Aircraft Corp.
Akron, O.

* * *

We're Sorry

Dear Sir:

The information in THE WELDING ENGINEER issue of September, 1953, regarding fabricated blast deflectors is not entirely accurate. The specification for the blast deflector (muzzle brake) requires heat-treated alloy steel to a yield strength range and Charpy impact tests at —20 F. In addition, the welded areas are radiographed for soundness. The steel is not "95,000 psi (annealed) steel" as stated in the article.

Acceptable blast deflectors have been cast. The casting costs, however, plus the additional radiographic expenses involved, have made the castings prohibitive on an equal bid basis. Therefore, only procurement of the welded deflector has been made for production.

A. H. Maggs,
Ordnance Corps,
Watervliet Arsenal,
Watervliet, N.Y.

The above letter refers to a news item headed "Welded Blast Deflectors Stand up Well in Combat" (page 5, September, 1953), in which a statement was made to the effect that it has not been possible to make satisfactory muzzle brakes out of cast steel. We're sorry that we gave our readers the wrong impression.

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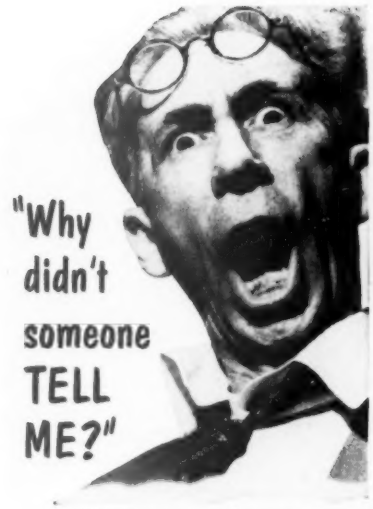

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Liked October Issue

Dear Sir:

Like so many people, I almost never write an editor, not even when I am displeased with what he is doing. Often I feel that I should write, especially when a good job is done. This time I am doing just that!

In my opinion, the October issue of THE WELDING ENGINEER is one of the best you ever put out. The safety articles were excellent and should be read by everyone in welding. If more management people would read your editorials and articles, you wouldn't have to write editorials on careless situations like the General Motors fire.

In the article on weldors' gloves, I learned for the first time the facts about the differences in these gloves. I am sure this article proved to be educational for all who read it; why not more like it? Your article on cutting steel underwater was different and interesting, too.

Keep up the good work! I learn something new from every issue of THE WELDING ENGINEER.

Very truly yours,
Harold E. Miller

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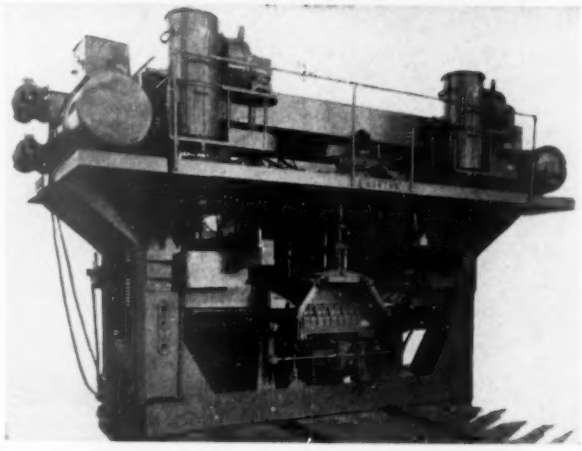

FIG. 3095 — CARGO BODY SUBMERGED ARC WELDER OFFERS THE FOLLOWING FEATURES:

- **Simultaneous 4 Head Operation**
- **Complete Automatic Control**
- **Power Load and Unload**
- **Automatic Parts Positioning**

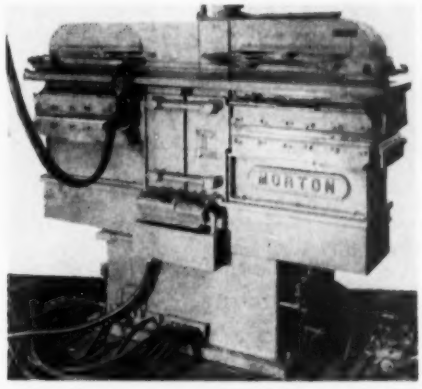

FIG. 3104 — CAPACITOR CAN INERT ARC WELDER OFFERS THE FOLLOWING FEATURES:

- **Twin Station for High Production**
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- **Automatic Cycle Control**
- **Power Ejection**

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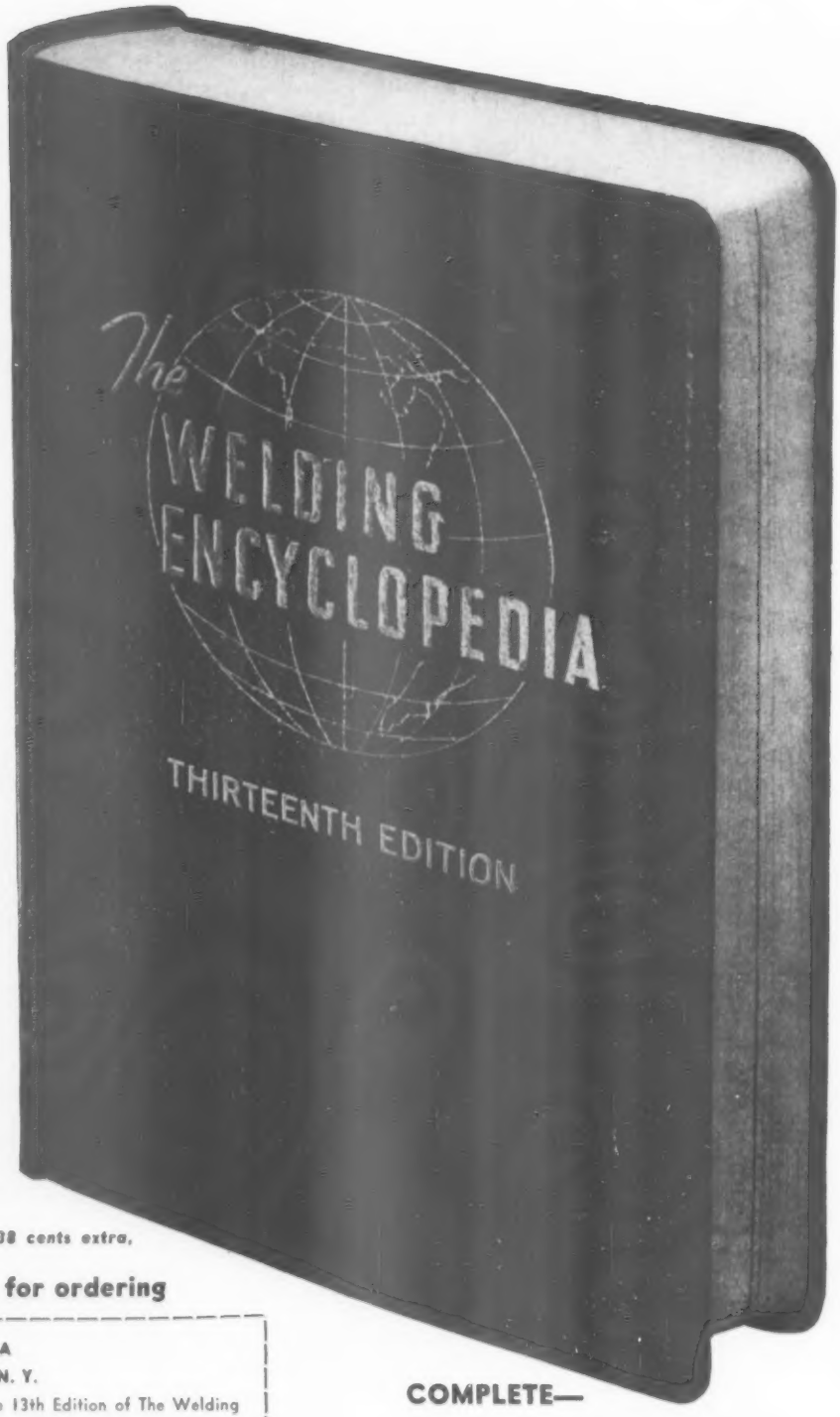

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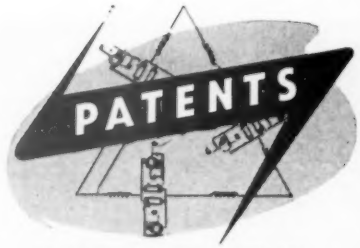


Multiple-Electrode Welding

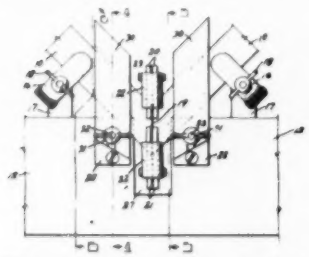
2,654,015. GEORGE C. LANDIS, South Euclid, and NORMAN J. HOENIE, Cleveland Heights, O. Assigned to The Lincoln Electric Co., Cleveland. Filed March 1, 1950. Granted Sept. 29, 1953.

This patent concerns a method of arc welding wherein an arc is established between a metallic work piece and the end of a metallic electrode. A plurality of electrodes, in spaced relation to each other, are fed simultaneously to the work piece. The same welding voltage is simultaneously supplied to the terminal portions of the electrodes adjacent their arc ends. As a result of such voltage, the current causes substantially instantaneous fusion of the end of any of the electrodes whenever such end comes into contact with the work piece. The electrodes are electrically connected in the welding circuit in parallel relation to each other.

* * *

Butt Welding

2,652,473. CARROLL G. GORDON, Pasadena, Calif., and ROBERT R. CAMERON, Denver. Filed Feb. 12, 1952. Granted Sept. 15, 1953.



This patent refers to a method of welding the abutting ends of two metallic bars. It comprises connecting the ends of both to one pole of an electric circuit and placing a relatively thin metallic insert between these ends. The insert is connected to the other pole of the circuit. Current is then passed through the circuit until the insert fuses and breaks the circuit.

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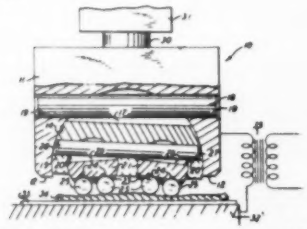
Welding Electrode

2,655,583. JOHN C. SOUTER, West Newbury, Mass. Assigned to Western Electric Co., Inc., New York City. Filed May 1, 1952. Granted Oct. 13, 1953.

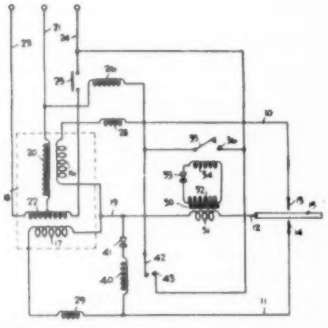


This patent refers to a welding electrode with a member having a surface and a circular aperture intersecting the surface short of the centerline of the aperture. This provides inwardly extending supporting portions. An element substantially circular in cross-section is supported for rocking movement in the aperture. Contacts are mounted at spaced positions on the element outside the aperture to move with the element to engage spaced porions of an article to be welded.

* * *

Two-Phase Welding System

2,653,277. IAN J. PICKERING, Birmingham, England. Assigned to The General Electric Co. Ltd., London. Filed Oct. 5, 1951. Granted Sept. 22, 1953.



This patent covers a two-phase welding apparatus in which two electrodes are arranged to be used simultaneously and in close proximity. The electrodes and the work are connected, respectively, to two phases and the common return lead of a two-phase welding current supply. A Scott-connected transformer provides the current from a three-phase supply. Included is a means, responsive to the current flow in the common return lead, that reduces the voltage between the electrodes to a value at which the interelectrode arc is extinguished by disconnecting one of the three-phase lines from the Scott-connected transformer.

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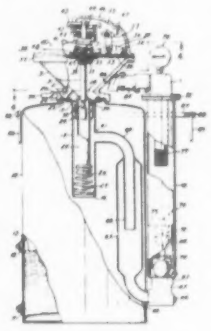
Portable Gas Generator

2,655,441. I. NEWTON LANGERMAN, Portland, Ore. Filed March 21, 1950. Granted Oct. 13, 1953.



This patent refers to a portable acetylene generator. The generator has a vertical cylinder with a water-filler opening below mid-height to insure a filling level of less than half. The cylinder has a top opening from which a vertical gas outlet tube extends downwardly within the tank. Its open lower end is approximately at the center of the tank and above the water level in all positions of the tank. A pressure-responsive carbide feeding mechanism is detachably mounted on the top above the opening. A carbide feed tube extends downwardly within the gas outlet tube.

* * *

Welding Beryllium

2,658,981. DAVID C. MARTIN, Worthington, O. Assigned to the U. S. Atomic Energy Commission. Filed Aug. 8, 1950. Granted Nov. 10, 1953.

The composition of a shielding gas used in a process for welding beryllium-base metals and the process itself are covered by this patent. The metals welded are covered with a gas consisting of from 95 to 99.5% by volume of an inert gas and from 5 to 0.5% by volume of a fluorochlorohydrocarbon selected from the group consisting of fluorochloromethanes and fluorochloroethanes.

* * *

Removing Oxides

2,655,481. IRVINE C. CLINGAN, Baltimore. Assigned to Eastern Stainless Steel Corp., Baltimore. Filed April 4, 1949. Granted Oct. 13, 1953.

This patent concerns a molten bath for removing oxides from the surface of metals. The bath consists of a fused substantially anhydrous mixture of 90 parts by weight of sodium hydroxide, 10 parts by weight of an alkali metal nitrate, about .1 to 4 parts by weight of sodium borate and a spectroscopic amount of iron.

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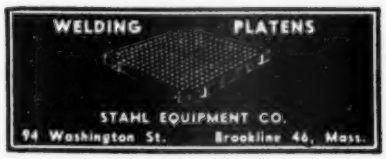

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